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THE EXCAVATION OF LOS MUERTOS
AND NEIGHBORING RUINS IN THE
SALT RIVER VALLEY, SOUTHERN ARIZONA

BY
EMIL W. HAURY

BASED ON THE WORK OF THE HEMENWAY
SOUTHWESTERN ARCHAEOLOGICAL EXPEDITION
OF 1887-1888

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TO
THE MEMORY OF MARY HEMENWAY
WHOSE INITIATIVE, GENEROSITY, AND UNDERSTANDING
SET IN MOTION THE FIRST ORGANIZED ARCHAEOLOGICAL
WORK IN THE SOUTHWEST



FOREWORD

THE not unpleasant task of preparing this foreword has been assigned to the writer because he chanced to be the sole survivor of the Hemenway Southwestern Archaeological Expedition of 1886-1889, and therefore in the belief that he could render a more or less personal account of its organization and activities. By far the pleasantest part of the assignment, however, is the consciousness that, by rendering this bit, he is enabled in a very meager way and after such a long period to pay homage to the memory of a great woman.

In connection with any archaeological research in the Southwest, it should not be overlooked that the first avowedly scientific work in the ancient remains of that region was that of the expedition sponsored by Mrs. Hemenway, with an equipment and with facilities never before equaled. Moreover, Frank Hamilton Cushing, the organizer of the expedition, justifiably believed that the only way in which intensive archaeological work could be conducted was by excavation. In this Cushing should be accorded every credit.

Chiefly through lack of means — for archaeological excavation is expensive — all research of the kind in the Southwest had hitherto been largely in the nature of reconnaissance and was therefore superficial. At best, archaeological study, however pursued, can contribute in only a relatively minor degree to a restoration of the culture of the people to whom the ancient remains are attributable. Without by any means decrying the value of Baudelier's years of research in the Southwest, for example, it was solely by reconnaissance that he made his observations on the prehistoric remains of the Pueblo peoples. Like his contemporaries — and we exclude the mere relic-hunters as beyond the pale — Baudelier used a meter-long walkingstick instead of the magic spade to reveal what treasures of information lay beneath the surface, consequently anything in the nature of culture stratification, which has proved to be of such prime importance to archaeology, was never suspected by Baudelier, Cushing, the Mindeleffs, or even by Fewkes, the latter of whom uncovered scores of ruins in the years following.

Let due credit therefore be accorded Cushing for developing a new method of Southwestern archaeological field research, which, with almost unlimited facilities, without being trammelled by official formalities such as hindered government researchers, and with lavish support, should have produced results of such marked importance that the work of the Hemenway Expedition would forever have stood as a noble monument to scientific endeavor.

Barring certain details in which the public would hardly be interested, Dr. Haury has covered so well the historical phases of the Hemenway Expedition that little else need be recorded in that direction. A few facts, however, should not be overlooked, for the success or failure of any scientific endeavor must rest with its organizer and director.

Frank Hamilton Cushing's spectacular adventure, early in 1882, in conducting four Zuni Indians and a Hopi to the East, where they were everywhere enthusiastically received, was well exploited by Sylvester Baxter in his article, "An Aboriginal Pilgrimage," published in *The Century Magazine*, followed by Cushing's "My Adventures in Zuni" which appeared in the same magazine in 1882-1883. There is little wonder, therefore, that Cushing and his Indian companions created almost a furor wherever they went. Representatives of the press followed them everywhere; they were entertained royally by savants and industrialists alike, by artists and journalists, by Wellesley students and by P. T. Barnum. They became a news feature of the period and their visit lingered long in the memories of the good people of Boston especially.

The Indians, however, attracted no more attention than Cushing himself, with his longish tow hair, his elaborate reddish deerskin costume adorned with many silver ornaments (his Navaho name meant "many buttons"), headband, eagle-feather erect, turquoise necklaces galore, all in strong contrast to the simple raiment of his Indian companions. But this was merely a reflection of Cushing's esthetic composition, for he had the making of a sculptor and painter of no mean ability. He was

likewise a visionary, with an almost uncanny insight into that which to others would be the unseen, as witness his assertion that were it possible to remove the elaborate wrappings from a ceremonial atlatl in the University Museum in Philadelphia, a turquoise bead, the "heart" of the implement, would be found within. Some time later the atlatl was exposed to X-rays, when, behold, the outline of a bead was clearly visible. Again, at Camp Hemenway in the Salt River Valley during the operations of the Expedition, Cushing was expounding to some visitors his belief that the Pueblo de los Muertos, where excavations were then in progress, had been destroyed by an earthquake. "But," interposed one of the visitors, "earthquakes have never been known in this valley." Scarcely had the words been uttered when the entire party jumped to their feet as Cushing quietly remarked, "An earthquake, gentlemen!" And, surely enough, this was the great Sonora earthquake of 1887 that was felt throughout southern Arizona.

Cushing's earlier years, those of a sickly child (he weighed a pound and a half at birth), were spent in the woods whenever opportunity afforded, living alone a part of the time in a wigwam of his own making. He became so immersed in Indian lore and Indian ways as to learn the process of stone-implement making, the fashioning of pottery, and the like. The first address before the Anthropological Society of Washington after its founding in 1879 was by Cushing on "Relic Hunting," followed shortly afterward by another on "Arrow-head Making." Leading the life of a primitive, the youth, even without the companionship of Indians at that time, in some strange manner learned and followed their mode of thought, which became a veritable part of him throughout his life. He never felt more at home than when squatting on the floor and addressing a company of distinguished guests; and he often seemed to forget on similar occasions that he was not one of an Indian gathering in Zuñi Pueblo.

With this insight into Cushing's mental equipment there is little wonder that during his life at Zuñi he acquired a great fund of intimate information, most of which has forever been lost. Considering his exceptional opportunities, the product of his studies in the

pueblo, where he was indeed a Zuñi familiar and a member of the tribe by adoption, may be characterized by its paucity; for instead of recording copious notes on his ethnologic and linguistic observations, he depended almost entirely on his memory and imagination.

Cushing's physical disability seemed not to curb his mental activity, for in those moments when a disordered stomach permitted him, he was as alert and agile as a cat, and as ready a speaker as ever graced a scientific assemblage. On one occasion when a lecturer of the evening before a large audience in Washington became stagestruck and could not proceed beyond the first few words of the address, Cushing leaped to the platform, and although he had never been in Mexico, presented a marvelously appealing and entirely impromptu comparison of certain Zuñi and Aztec concepts, much to the delight of the audience and the salvation of the announced lecturer.

Even if not always accurate in his statements, whether voiced or written, and even if given to exaggeration to gain a point, Cushing always was both plausible and appealing. It doubtless was this side of Cushing that was revealed to Mrs. Hemenway, as to many others, while his ill health added in no small measure to the sympathy which he aroused. Although Mrs. Hemenway was deeply interested in the research Cushing had outlined while at Manchester in 1886, the good lady was constantly solicitous of his health, which was to be of first consideration, the scientific research in the field to be subordinate thereto. And it was this, as much as anything, that led Cushing to forego much that he could have done at Camp Hemenway, for even during the most favorable periods of his health he devoted much time to trivial things while the work of excavation, conducted entirely by Mexican laborers, proceeded under its own momentum.

It may be ungracious to thus speak of one who passed away more than forty years ago, yet it seems important to the science of which he was an advocate that this insight into his character and attitude be revealed, since it had a vital bearing on the methods and results of his work, and explains in some degree the lack of information that the operations of the Hemenway Expedition suffered.

If a paucity of material was left by the di-

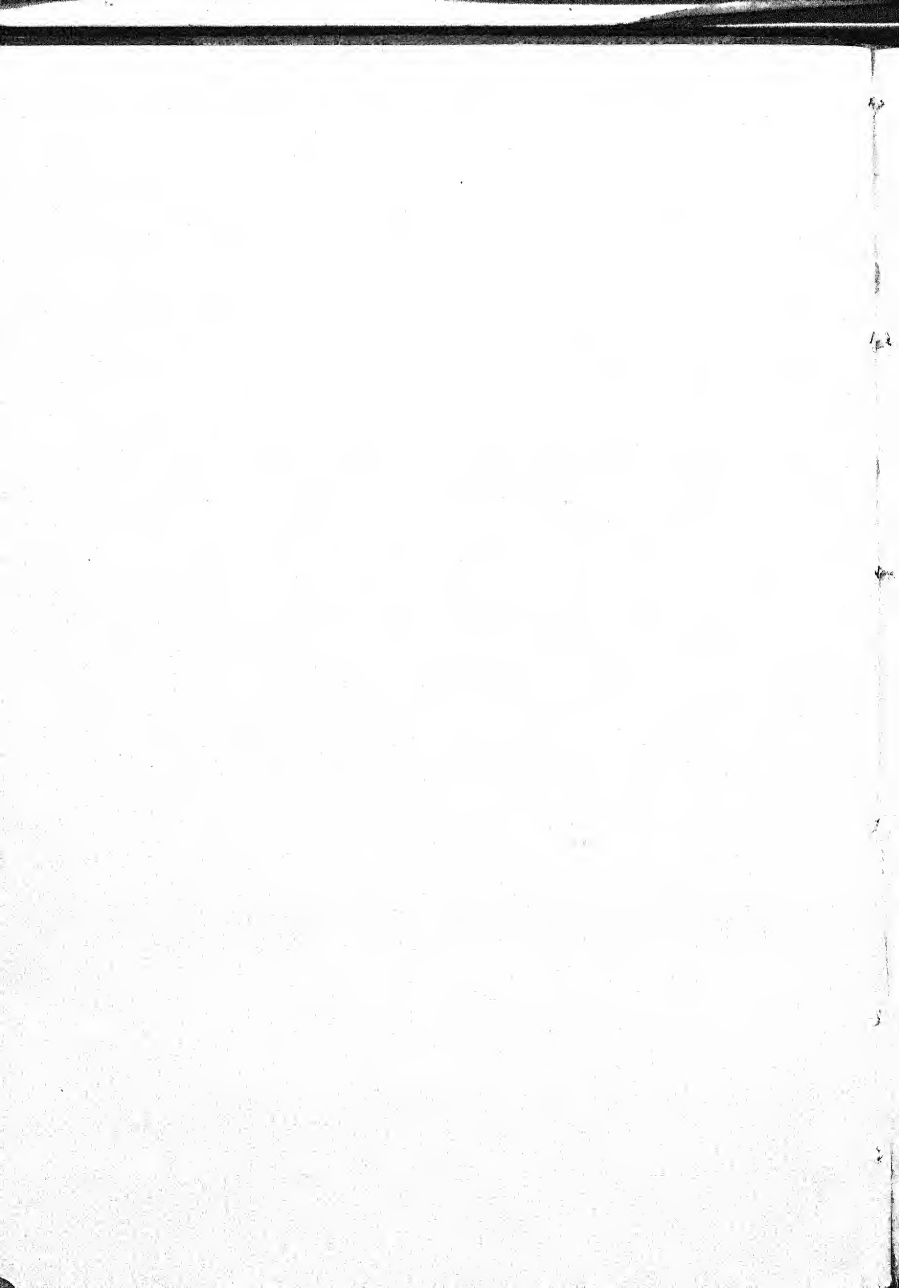
rector of the Expedition, it was due also in part to an overwrought imagination and a species of egotism that brooked no opinion adverse to his own and accepted no suggestion of scientific help on the part of others. We may cite the instance of the hard-fired mesquite pits uncovered in the Salt River Valley, which Cushing insisted were "smelters" on the ground that some copper bells (obviously of Mexican origin) were unearthed round about, as elsewhere at many Southwestern sites.

It is hardly necessary to appraise the objective scientific results of the Hemenway Southwestern Archaeological Expedition, as this has been ably done by the author of the accompanying memoir. The artifacts are extensive and important, especially in the light of comparative archaeological research in more recent years, in which Dr. Haury has taken an impor-

tant part. That the director of the field work of the Expedition, with all the facilities at his command, left such a woefully small body of descriptive data pertaining to the excavations and their results is sincerely to be regretted; but it arouses admiration for the author of the present monograph, who has performed a difficult task so well, even in the face of this lack. The splendid support by Mrs. Hemenway in this, as in other endeavors, to increase and diffuse knowledge, is worthy of the highest praise by every student of Southwestern archaeology. It is a pity that the results in the present instance could not have been commensurate with her interest and beneficence.

F. W. HODGE

May 1, 1942
Los Angeles, California



ACKNOWLEDGMENTS

THIS paper was originally written and presented as a doctor's dissertation at Harvard University in 1934. It now falls to the writer—eight years later—to prepare the same for publication. A better way to impress on one the progress of southwestern archaeology cannot be found than to have the task of revising an old manuscript. Recent studies of Gila Pueblo, of Mr. and Mrs. Wetmore Hodges in co-operation with Gila Pueblo, of the Pueblo Grande Laboratory of Phoenix, and of the University of Arizona, have made obsolete certain portions of the original paper and have called for extensive revision of other sections. This has been done, and at the same time the original paper has been extensively condensed. In spite of the rapid forward stride in our researches in the last decade, it is felt that much of the work of the Hemenway Expedition of more than fifty years standing, is still fundamental and therefore merits the space devoted to it here. Its collections, furthermore, in some respects, have never been paralleled.

During the course of preparing and studying the Hemenway material, assistance was generously given me by many individuals. The project was outlined and arranged for jointly by Dr. A. M. Tozzer and Mr. Donald Scott, representing the Division of Anthropology of Harvard University and the Peabody Museum, respectively. To Mr. Scott I am especially obligated for placing at my disposal all facilities to carry on the work, and for assuming the expense connected with the drawing of the text figures and the photographing of the specimens. Mr. F. P. Orchard gave much of his time in supervising the photography of articles illustrated and it is a pleasure to credit him with the coloring of the photograph of inlaid shell articles reproduced in the frontispiece. I cannot adequately express my satisfaction in the accompanying text figures—drawn by Mr. Elmer A. Rising. All specimens have been faithfully reproduced by the aid of a camera lucida and the details are superbly shown by Mr. Rising's skillful control of the pen.

Dr. H. J. Spinden, of the Brooklyn Museum, kindly gave me access to several volumes of Mr. Cushing's notes with the hope of finding some pertaining to the work in Arizona. Although this search was without avail, the drawings shown in figures 23 and 25 were found and are here used through the courtesy of the Brooklyn Museum. I am indebted to Dr. A. V. Kidder for allowing me the free use of Cushing's original but uncompleted manuscript. To the Peabody Museum of Salem, Massachusetts, and Mr. Lawrence W. Jenkins, Assistant Director in Charge, thanks are due for the opportunity to examine a small collection of Los Muertos specimens—mainly pottery—given that museum when the bulk of the material passed into the hands of the Peabody Museum of Harvard University.

It is also a pleasure to acknowledge the assistance rendered by the following persons in the identification of various materials: for animal bones, the late Dr. Glover M. Allen, of the Museum of Comparative Zoölogy, Harvard University; for rocks and minerals, Drs. Kirk Bryan and Charles Palache of the Division of Geology, Harvard University; for vegetal products, Dr. H. W. Youngken of the Massachusetts College of Pharmacy, Boston, and Dr. J. J. Thornber, Botanist, University of Arizona, Tucson; and for shells, Mr. W. J. Clench, Curator of Mollusks, Museum of Comparative Zoölogy, Harvard University. Dr. E. A. Hooton of the Division of Anthropology was instrumental in having me examine the cremated human remains, evidence which heretofore has been generally neglected because of its supposed uselessness. Dr. Hooton contributed by way of directing and checking the results of this task.

I had repeated occasion to turn to Dr. F. W. Hodge, member of the expedition and now director of the Southwest Museum, Los Angeles, for information. My requests were always cheerfully met. I am also indebted to Dr. Hodge for reading the manuscript and for correcting certain glaring inaccuracies.

It was a rare privilege to have had the late

Dr. Roland B. Dixon of the Division of Anthropology, Harvard University, as my advisor throughout this work. Such merit as it may possess is in great part due to his council and supervision.

Finally, to the Administration of the University of Arizona thanks are due for giving

me leave from academic duties in the fall of 1941 to make the necessary revisions of the manuscript.

EMIL W. HAURY

December 1, 1941
University of Arizona

CONTENTS

INTRODUCTION	3	COLONIAL-SEDENTARY PERIOD SITES	173
HISTORICAL NOTES	5	Los Guanacos	173
THE SALT RIVER VALLEY	10	Pottery	173
Environmental background	10	Red-on-buff	173
Archaeological background	12	Polychrome	174
CLASSIC PERIOD SITES	14	Red ware	174
Los Muertos	14	Plain ware	174
General description	14	Intrusive pottery	174
Architecture	17	Miscellaneous objects of clay	174
Discussion	32	Objects of stone	176
Refuse heaps	37	Objects of shell	178
Pit ovens	37	Objects of bone	178
Canals	39	Perishable objects	178
The age of Los Muertos	42	Wood	178
Disposal of the dead	43	Textiles	178
Inhumations	44	Los Hornos	179
Cremations	44	Pottery	180
The Problem of physical type	48	Red-on-buff	180
Pottery	49	Polychrome	180
Red-on-buff	50	Red ware	180
Polychrome	63	Intrusive sherds	180
Red ware	80	Miscellaneous clay objects	180
Plain ware	101	Objects of stone	181
Intrusive pottery	106	Objects of shell	182
Miscellaneous clay objects	108	Objects of wood	182
Objects of stone	123	Copper bell	183
Chipped stone implements	123	Objects of bone	183
Pecked and polished implements	126	Pueblo de las Canopas	184
Unworked stone	144	Objects of stone	185
Objects of shell	145	Objects of shell	185
Marine shells	146	MISCELLANEOUS RUINS	186
Freshwater shells	146	Pueblo del Patricio	186
Land shells	146	La Ciudad de los Pueblitos	186
Unworked shell	147	El Pueblo de las Piedras	188
Worked shell	147	Los Pueblos Arriba	189
Discussion	159	Other Salt River Valley sites	189
Objects of bone	159	Casa Grande	189
Metal working	160	Pottery	189
Perishable materials	162	Objects of stone	191
Las Acequias	163	Casa Blanca	191
Pottery	164	Pueblo de las Cenizas	191
Red-on-buff	164	La Presa Antigua	192
Polychrome	165	CAVE WORK	193
Red and smudged ware	165	Double Butte Cave	193
Plain ware	166	Pottery	193
Corrugated ware	166	Cane cigarettes	194
Miscellaneous clay objects	166	Pahos	196
Objects of stone	166	Arrows and foreshafts	200
Chipped stone	166	Copper	201
Pecked and polished stone	167	Gourd	201
Objects of shell	169	Cordage and textiles	201
Objects of bone	170	Cave in Superstition Mountains	202
Perishable objects	170	CONCLUSIONS	204
Objects of wood	170	BIBLIOGRAPHY	217
Basketry	170		
Textiles	172		

LIST OF FIGURES

1. Map of Salt River Valley	11	41. Steps in the ornamentation of a Tonto Polychrome jar	69
2. Map giving the locations of house units in Los Muertos	15	42. Types of ornamentation in Gila and Tonto Polychromes	72
3. Los Muertos. Plan of Ruin I	18	43. Los Muertos. Styles of treatment of the primary field in Gila Polychrome bowls	73
4. Los Muertos. Section of wall in Ruin I	19	44. Los Muertos. Styles of treatment of the primary field in Gila Polychrome bowls	74
5. Los Muertos. Plan of Ruin II	20	45. Los Muertos. Band patterns on recurved bowl interiors	74
6. Los Muertos. Skeleton of an adult and infant in Ruin II	20	46. Los Muertos. Outside bowl decoration on Gila and Tonto Polychromes	75
7. Los Muertos. Plan of Ruin III	22	47. Los Muertos. Rim decorations on Gila Polychrome	75
8. Los Muertos. Plan of Ruins IV and V	23	48. Los Muertos. Elements of decoration occurring in Gila Polychrome	78
9. Los Muertos. Plan of Ruin VI	23	49. Los Muertos. The "bird-wing" pattern and probable related forms	79
10. Los Muertos. Plan of Ruin VII	24	50. Section drawings showing two-piece method of constructing jars and types of handle attachments of pitchers	82
11. Los Muertos. Plan of Ruin IX	25	51. Los Muertos. Patterns produced by the polishing striations on Gila Smudged bowls	85
12. Los Muertos. Plan of Ruin XI	26	52. Los Muertos. Polishing patterns on small jars, pitchers, and beakers of Gila Smudged	86
13. Los Muertos. Plan of Ruin XIII	27	53. Los Muertos. Salt Red sherds showing sharp tool impressions and plastic ornament	86
14. Los Muertos. Plan of Ruin XIV	28	54. Los Muertos. Gila and Salt Smudged bowl shapes	88
15. Los Muertos. Plan of Ruin XVII	29	55. Los Muertos. Gila and Salt Smudged rim sections of bowls	89
16. Los Muertos. Plan of Ruin XIX	30	56. Los Muertos. Gila and Salt Red jar shapes	91
17. Los Muertos. Plan of Ruin XX	31	57. Los Muertos. Gila and Salt Red shouldered jars	93
18. Los Muertos. Plan of Ruin XXI	32	58. Los Muertos. Gila and Salt Red jars	94
19. Los Muertos. Plan of Ruin XXII	33	59. Los Muertos. Gila and Salt Red pitcher shapes	96
20. Los Muertos. Plan of Ruin XXIII	34	60. Los Muertos. Variations in profile and outlines of Salt Red scoops	97
21. Los Muertos. Plan of Ruin XXIV	34	61. Los Muertos. Salt Red beakers, mugs, cup, and bird effigy shapes	99
22. Los Muertos. Plan of Ruin XXV	36	62. Los Muertos. Black decoration on exterior of red ware bowl	100
23. Los Muertos. Cross sections of pit ovens	38	63. Los Muertos. Gila Plain jar shapes	103
24. Hemenway Expedition map of aboriginal canals	40	64. Los Muertos. Gila Plain jar shapes	104
25. Sketch of irrigating canal showing secondary ditch within	41	65. Los Muertos. Reconstructed shapes of intrusive neck-corrugated jars	108
26. Cross sections of paddle-and-anvil and coiled pottery	51	66. Los Muertos. Miniature vessels	109
27. Los Muertos. Casa Grande Red-on-buff jar shapes	52	67. Los Muertos. Sections of earthenware baking griddles	110
28. Los Muertos. Casa Grande Red-on-buff pitcher shapes	54	68. Los Muertos. Rim sections of perforated plates	111
29. Los Muertos. Red-on-buff effigy jar fragments	54	69. Los Muertos. Human figurines and fragments	112
30. Variations in band arrangement of decoration on Casa Grande Red-on-buff	55	70. Los Muertos. Animal figurines	114
31. Variations in treatment of neck bands on Casa Grande Red-on-buff jars and pitchers	56	71. Los Muertos. Spindle whorl types	116
32. Type I designs of Casa Grande Red-on-buff	57	72. Los Muertos. Forms of decoration on spindle whorls	118
33. Structure of Type II patterns occurring on Casa Grande Red-on-buff	58		
34. Type II designs on Casa Grande Red-on-buff	59		
35. Variations in treatment of body bands on Casa Grande Red-on-buff	61		
36. Los Muertos. Elements of design on Casa Grande Red-on-buff	62		
37. Los Muertos. Design on Casa Grande Red-on-buff bowl	62		
38. Los Muertos. Gila Polychrome bowl shapes	65		
39. Los Muertos. Rim sections of Gila Polychrome bowls	66		
40. Los Muertos. Gila Polychrome small jar shapes	67		

LIST OF PLATES

xv

73. Los Muertos. Clay pendants and heads of bird jars	120	104. Las Acequias. Notched hoe and cutting blades	167
74. Los Muertos. Pottery scraper, pipe fragment, and miscellaneous clay objects	122	105. Las Acequias. Arrow shaft straighteners	168
75. Los Muertos. Side and end views of clay beads	123	106. Las Acequias. Miniature slate palette, lava "medicine" stone, and fragment of carved animal	168
76. Los Muertos. Outlines, longitudinal, and lateral sections of metates	127	107. Las Acequias. Double-perforated stone	169
77. Los Muertos. Outlines, longitudinal, and lateral sections of the chief mano types	128	108. Las Acequias. Shell objects	169
78. Los Muertos. Section drawing of fragmentary paint mortar	128	109. Las Acequias. Bone objects	170
79. Los Muertos. Notched hoe	135	110. Las Acequias. Wooden paddle-shaped implements	170
80. Los Muertos. A pounder of lava	136	111. Las Acequias. Three-rod foundation coiled basketry	171
81. Los Muertos. Outlines and sections of crushers	137	112. Los Guanacos. Miscellaneous clay objects	175
82. Los Muertos. Fragment of schist notched for use as a saw	138	113. Los Guanacos. Slate palette	177
83. Los Muertos. Outlines and sections of stone jar stoppers	139	114. Los Guanacos. Carved, engraved, and painted shell objects	177
84. Los Muertos. Schist blade with notched edges	141	115. Los Guanacos. Spatulate tool of ironwood	178
85. Los Muertos. Bird pendants of schist and steatite	143	116. Los Guanacos. Fragment of fancy twill and reconstructed design	179
86. Los Muertos. Bead rasp of tuff	144	117. Los Hornos. Pit oven	180
87. Los Muertos. Miscellaneous stone objects	145	118. Los Hornos. Miscellaneous clay objects	181
88. Los Muertos. Shell needles	147	119. Los Hornos. Carved shell objects	182
89. Los Muertos. Shell scrapers	148	120. Los Hornos. Wooden paddle-shaped tool	183
90. Los Muertos. Shell disc beads	148	121. Las Canapas. Stone and shell objects	184
91. Los Muertos. Irregular shell beads	149	122. Del Patricio. Thick-walled effigy vessel	186
92. Los Muertos. Cut shell pendants	150	123. Miscellaneous objects from Pueblo del Patricio, Los Pueblitos, and Las Piedras	187
93. Los Muertos. Shell carvings	151	124. Miscellaneous objects from Pueblos Arriba and Casa Blanca	188
94. Los Muertos. Shell carvings	153	125. Casa Grande. Miscellaneous objects	190
95. Los Muertos. Variations in the treatment of the umbo of shell bracelets	155	126. Las Cenizas. Fragment of effigy head	191
96. Los Muertos. Fragments of carved bracelets	156	127. Double Butte Cave. Pahos	197
97. Los Muertos. Worked shell objects	157	128. Double Butte Cave. Effigy pahos	199
98. Los Muertos. Painted shell, carved, inlaid, and painted bracelet and ring patterns	158	129. Double Butte Cave. Arrow foreshaft fragments	201
99. Los Muertos. Bone and horn objects	161	130. Diagrammatic drawing of "sash" found on cane cigarettes	202
100. Las Acequias. Thick-walled vessel	165	131. Mesquite club from cave in Superstition Mountains	203
101. Las Acequias. Salt Red sherd with scratched pattern	166	132. Frontiers of Pueblo and Hohokam Cultures during Colonial-Pueblo I times	206
102. Las Acequias. Lava paint mortar	166	133. Frontiers of Pueblo and Hohokam Cultures during Classic-Pueblo IV times	206
103. Las Acequias. Axes and double-bitted implement	167		

LIST OF PLATES

Frontispiece. Painted and inlaid shell jewelry from Los Muertos and Los Guanacos.

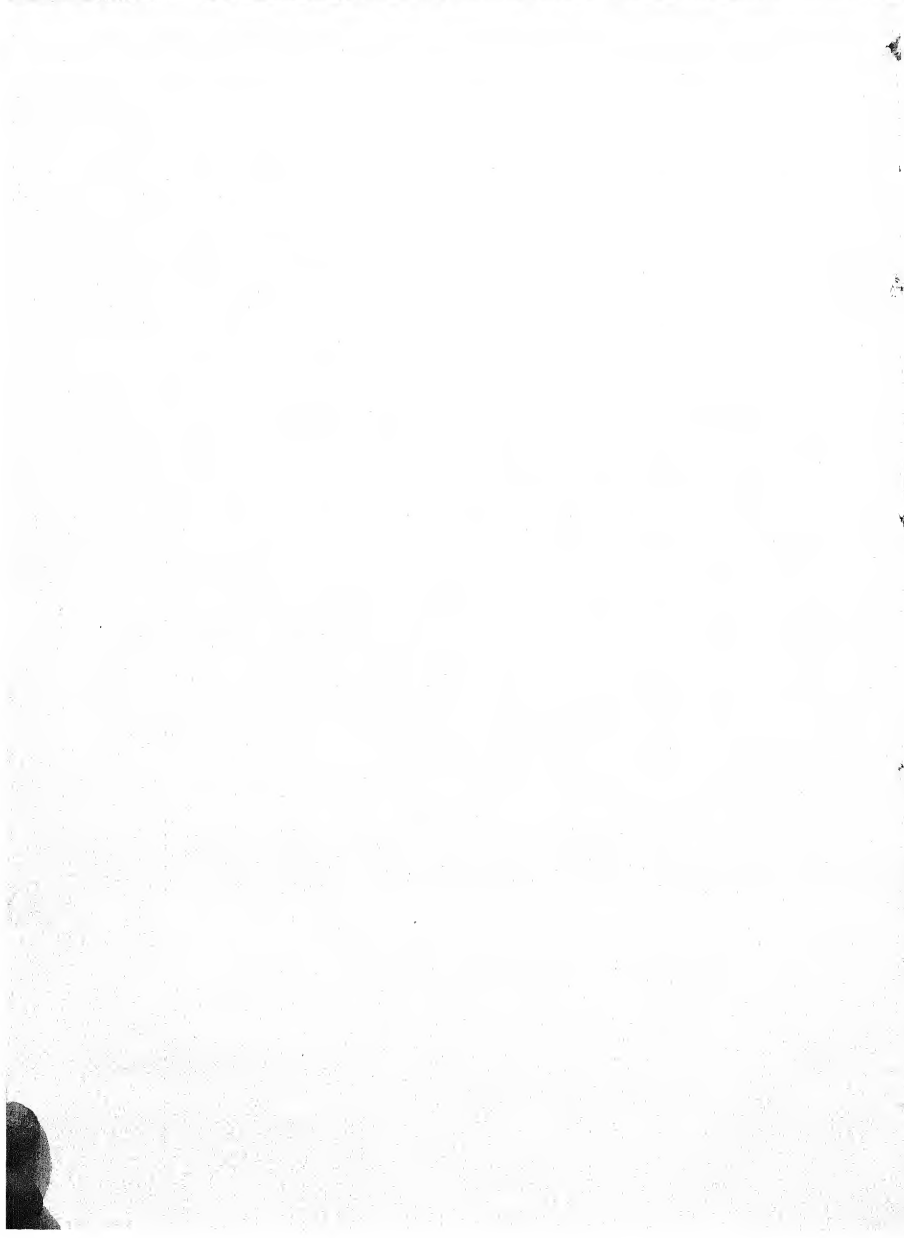
1. Los Muertos. The north wall of Ruin I.
- 2a. Los Muertos. Ruin II showing artifacts *in situ*.
- 2b. Los Muertos. A partly excavated room located between Ruins IV and V.
- 2c. Los Muertos. Skeleton of a man in Room *k*, Ruin VII.
- 2d. Los Muertos. Sub-floor pits in Room *b*, Ruin XIII.
- 3a. Los Muertos. Room *t* of Ruin XVII.
- 3b. Los Muertos. A double burial in Ruin XIII.
- 3c. Los Muertos. Grave of young female in Ruin XX.

3d. Los Muertos. So-called "sarcophagus" burial in Ruin I.

- 4a. Los Muertos. Pyral cemetery east of Ruin XXI.
- 4b. Los Muertos. Cremation urn with ashes removed.
5. Los Muertos. Santa Cruz and Sacaton Red-on-buff sherds.
6. Los Muertos. Casa Grande Red-on-buff jars.
7. Los Muertos. Casa Grande Red-on-buff vessels.
8. Los Muertos. Pottery foreign to Los Muertos, Tanque Verde Red-on-brown.
9. Los Muertos. Gila Polychrome showing evidence of a coiled technique.
10. Los Muertos. Gila Polychrome bowls.

11. Los Muertos. Gila and Tonto Polychrome vessels.
12. Los Muertos. Large Gila and Tonto Polychrome jars.
13. Los Muertos. Fragments of polychrome effigy jars in Gila and Tonto Polychrome.
14. Los Muertos. Large Salt Red jar showing intentional firing clouds.
15. Los Muertos. Gila and Salt Smudged bowls.
16. Los Muertos. Salt Smudged bowls.
17. Los Muertos. Salt Red shouldered jars.
18. Los Muertos. Gila and Salt Red shouldered jars.
19. Los Muertos. Gila and Salt Red jars.
20. Los Muertos. Gila and Salt Red pitchers.
21. Los Muertos. Salt Red bird effigies, mugs, and beakers.
22. Los Muertos. Gila Plain jars.
23. Los Muertos. Gila Plain vessels.
24. Los Muertos. Intrusive decorated sherds.
25. Los Muertos. Salt Red scoops.
26. Los Muertos. Incurved vessel, view of tripod vessel, white-on-red jar, and red ware bowl.
27. Los Muertos. Intrusive neck-corrugated jar sherds.
28. Los Muertos. Views of earthenware griddles.
29. Los Muertos. Fragments of perforated plates.
30. Los Muertos. Spindle whorls (?) made from potsherds.
31. Los Muertos. Stone knives.
32. Los Muertos. Picks and chipped and notched blades.
33. Los Muertos. Metate types.
34. Los Muertos. Pestles and mortar.
35. Los Muertos. Stemmed arrow points.
36. Los Muertos. Arrow points without stems and drills.
37. Los Muertos. Paint mortars and pestle.
38. Los Muertos. Forms of rubbing stones.
39. Los Muertos. Rubbing stones.
40. Los Muertos. Abrading stones.
41. Los Muertos. Hand rasps.
42. Los Muertos. Hammerstones.
43. Los Muertos. Technological series showing axes in process of manufacture and a reworked axe.
44. Los Muertos. Three-quarter grooved axes.
45. Los Muertos. Types and profiles of axes.
46. Los Muertos. Three-quarter grooved axes.
47. Los Muertos. Technological series of double-bitted axes.
48. Los Muertos. Double-bitted axes.
49. Los Muertos. Adzes.
50. Los Muertos. Rock spalls.
51. Los Muertos. Hoes with sharpened edges and unworked ends and backs.
52. Los Muertos. Rectangular hoes.
53. Los Muertos. Oval and lunate hoes.
54. Los Muertos. Notched hoes.
55. Los Muertos. Hoes.
56. Los Muertos. Narrow hoes.
57. Los Muertos. Crushers.
58. Los Muertos. Stone chisels.
59. Los Muertos. Pottery polishers and scraper.
60. Los Muertos. Arrow shaft straighteners.
61. Los Muertos. Arrow shaft straighteners.
62. Los Muertos. Slate palettes and pointed slate objects.
63. Los Muertos. Stone rings and balls.
64. Los Muertos. Fragments of animal effigies and "medicine" stones.
65. Los Muertos. Stone discs and spindle whorls.
66. Los Muertos. Stone pendants.
67. Los Muertos. Oddly shaped natural stones.
68. Los Muertos. Unworked shell.
69. Los Muertos. Whole shell beads.
70. Los Muertos. Whole shell and tinkler pendants.
71. Los Muertos. Bracelets in process of manufacture.
72. Los Muertos. Shell rings.
73. Los Muertos. Shell trumpets.
74. Los Muertos. Wooden tools.
75. Los Muertos. Negative and cast of matting impression on baking griddle.
76. Las Acequias. Casa Grande Red-on-buff.
77. Las Acequias. Gila and Tonto Polychrome vessels.
78. Las Acequias. Gila and Salt Red.
79. Las Acequias. Chipped implements.
80. Los Guanacos. Large Salt Red jar.
81. Los Guanacos. Projectile points, green crayons, and crusher.
82. Los Guanacos. Clay animal effigies.
83. Los Hornos. Santa Cruz Red-on-buff vessels.
84. Los Hornos. Early red-on-buff sherds.
85. Los Hornos. Perforated plate and copper bell.
86. Los Hornos. Miscellaneous stone objects.
87. Double Butte Cave. Ceremonial cane cigarettes.
88. Double Butte Cave. Ceremonial cane cigarettes.
89. Double Butte Cave. "Sash" and other objects found on cane cigarettes.
90. Double Butte Cave. Cotton cordage and "sashes" from cane cigarettes.

THE EXCAVATION OF LOS MUERTOS AND NEIGHBORING RUINS
IN THE SALT RIVER VALLEY, SOUTHERN ARIZONA



INTRODUCTION

TO THE Hemenway Expedition we largely owe the awakening of interest in the archaeology of southern Arizona. Notice of its work was liberally given by eastern newspapers and the scientific world was first made aware of its findings in 1888 when Prof. Edward S. Morse, of Salem, and Mr. Sylvester Baxter, of Boston, described the researches of the Expedition before the Seventh Congress of Americanists in Berlin. A paper of Cushing's to have been read before this session did not arrive in time but space was found for it later in the published report of the Congress.¹ The final report on the Expedition's work was never completed due to Cushing's failing health and death on April 10, 1900.

During its fifteen-month stay in the Salt River Valley in 1887-1888, upwards of 5000 archaeological specimens were collected by the Expedition. The chief reasons for publishing at this late date are to make available to present-day investigators an incomparable amount of material from the late prehistoric cultures of southern Arizona, and to round out and bring to a conclusion the work of this early archaeological Expedition. The Classic Period of Hohokam history, to which most of the collection must be allocated, has actually never been fully defined from the standpoint of material culture. Little evidence indeed has been used to secure it. The Hemenway Collection goes a long way towards supplying this needed information. Further, through the Expedition's efforts, we have good architectural data on Los Muertos, probably the largest community in southern Arizona in pre-Spanish times. Apart from Fewkes' ² work at Casa Grande, almost no plans of Classic Period sites have been published. In fact, Fewkes' own interest in Southwestern archaeology, culminating in a long and fruitful career, can be directly traced to the Hemenway Expedition's Salt River Valley studies.

A collection of such long standing, made when there was little emphasis on field methods and when field notes were not kept as

completely as might be desired, has naturally lost much of its scientific value. This is even more true when one who was not present during the investigations attempts its interpretation. Although it was Cushing's desire to amass a group of artifacts which, by careful notations concerning the manner of occurrence, should be capable of teaching a maximum number of facts, this end was only partly realized. The inadequacy of the records causes the following paper to be largely descriptive, although an attempt has been made to introduce interpretive matter wherever possible. The opinions expressed herein, based on recent archaeological research, do not all agree with those advanced by the leader and the members of the Expedition. For example, Cushing's theory of the existence of a class system to account for marked differences in material culture in associated house remains is now replaced by the recognition of two ethnic groups—the Hohokam and the Pueblo—who, for a relatively brief period in pre-Spanish times, were in direct contact. A distinction has been made between purely factual context and that part of the discussion which attempts to fit the remains into their proper place in the whole, allowing the reader to identify fact from the coloring of the writer's own interpretation which may or may not be acceptable. I have refrained from assigning any value to specimens in the collection which were undocumented or about which there appeared confusion as to provenience.

The general method of this report will be to take each ruin investigated in turn. Priority is given to Los Muertos—a late prehistoric community comparable in age to Pueblo IV ruins farther north in Arizona—because here the explorations were the most extensive and the resultant collections were the largest. Following Los Muertos, the kindred village of Las Acequias will be disposed of before taking up those which represent the early end of the time scale. These are Los Hornos, Las Canopas, and Los Guanacos, together with

¹ Cushing, 1890, pp. 151-194.

² Fewkes, 1912.

With its complete organization both at home and in the field, and with its ample financial backing, the Hemenway Expedition was one of the best equipped and perhaps the most ambitious groups that has ever entered the southwestern United States for archaeological work.

Early in December, 1886, a party, consisting of Mr. and Mrs. Cushing, Miss Margaret W. Magill, artist and sister of Mrs. Cushing, Dr. F. W. Hodge, and the three Zufis, departed from Cushing's home at Albion, N. Y. for Fort Wingate, New Mexico, their western destination. At that time the village of Zufi was most accessible from this point on the railroad. A wagon trip thence was made immediately to return the Zufis to their Pueblo home.

Up to this time, definite plans for the proposed two years' field work had not been reached. Cushing's preliminary plan we can best follow in his own words: "I had at first intended to begin field work around and to the west and southwest of Zufi, and thence to progress gradually farther west and south, connecting our northern research with studies of ruins in the Gila and tributary valleys through the important and comparatively unknown but archaeologically rich territory drained by the Upper Salado or Salt River. It had, it is true, occurred to me that in case snow or cold interfered with this plan it might be well to proceed as directly as possible over the Escudilla Pass and Mogollon Mountains directly to the Upper Salado."

However, even before the party could fully organize, the winter weather was upon them, and seemingly with more than usual severity. This fact, coupled with Cushing's ill health, and the wretched condition of available mules on which the party had to rely as draft animals, rendered the mountain passage extremely hazardous, if not impossible. Consequently, Cushing "determined to make a long detour by railroad as far as Ash Fork, in Western Arizona, then proceed, before the February snows set in, to the Lower Salado, and thus by a journey of over three hundred miles reach by springtime the basins, valleys and canyons of the Upper Salado."

With this plan in mind, which was amplified during the brief trip to Zufi, arrangements were begun at once for Zufi helpers to accompany the party into the southern and warmer

climate. With the promise that he would soon be back to get the men, Cushing and Hodge returned to Fort Wingate, there to begin preparations for the journey in earnest.

On December 30, 1886, Cushing departed for Albuquerque to lay in necessary provisions, which "included cooking and dining utensils, blankets, firearms, and one very heavy Newton wagon, and a large or double as well as a single buckboard. . . ." These provisions were shipped by freight on the old Atlantic and Pacific Railroad (now the A. T. & S. F.) which reduced the rates both for matériel and for the personnel of the party later to leave from Fort Wingate. Back at Fort Wingate again, through the co-operation of Lieutenant Gilman, additional camp and commissary supplies were obtained.

Then followed a second trip to Zufi. Cushing was taken ill at the end of the first day's travel and was forced to remain at their overnight camp, in the Zufi Mountains above Nutria, while Hodge, accompanied by a Zufi who had drifted in during the night, proceeded on to the Pueblo. There he arranged for two Zufis—Weta and Siwatitsalu—to return with him and act as informants and herders. Cushing was found much improved and the return trip to Fort Wingate was completed without incident.

Cushing again went to Albuquerque for the dual purpose of purchasing further supplies, and to meet Mrs. Hemenway, en route to the Pacific coast with a party of friends. Joining this group on January 14, 1887, he proceeded with them as far as Flagstaff, acquainting Mrs. Hemenway with the plans of the Expedition.

While waiting for the east-bound train at Flagstaff which was to carry him back to Fort Wingate, Cushing walked east of the station along the track and found in a cut, recently deepened by freshets, a few sherds and a small bird-shaped jar—the first specimen, as he said, that the Expedition collected. This chance find he considered as an omen of good fortune for the Expedition's future work.

Meanwhile, the purchase of stock had been completed. Ten mules and three riding horses formed the herd which they were then able to gather. These animals and the camping equipment had now to be collected and loaded on

two freight cars which the Atlantic and Pacific Railroad had sidetracked for their use at Wingate station. This work was completed on January 19 and on the following day the initial stage of the journey afield was begun.

Train riding impressed the two Zúñis deeply, and at Winslow where all dismounted to dine, one of the Indians could not be persuaded to leave the car for fear that the "iron horse, like any other, might run off." In a dining station later on, the waiters found, first to their amusement and later to their chagrin, that each time bread was served to one of the Indians, all of the slices were promptly removed and laid beside his plate, while the next Indian would do the same from a replenished service plate. The waiters eventually learned to bring in only the requisite individual helping.

After midnight on the day of departure, Prescott Junction was reached, the terminus west of Ash Fork for the newly built spur extending from the main line to Prescott. Here the party dismounted and the members were conducted to the new hotel, the "Pioneer, the finest outside of Prescott, especially in the way of grub-stakes," as it was described by the keeper. Cushing's descriptions of the incidents which follow make clear the frontier character of the country they were entering. The hotel, they found, "contained a lower story of unseasoned lumber, crackly in the extreme, through which the wind played jew's-harp music on the slivers. . . . The upper story was even more diaphanous than the lowermost. Here cheese-cloth, braced here and there by stronger cotton, swayed and bellied as taut sails in a wind, occasionally giving increase to little puffs of frosty mountain air." The party spent a none too comfortable night and on the following day the ladies awaited the train for Prescott while Cushing returned to Ash Fork to join Hodge and Garlick in the unloading of the equipment. Here a temporary camp was set up in order to provide shelter from a threatening snow storm, while the wagons were being assembled and loaded for the journey. During the first night in this camp a stranger stole into the tent to seek warmth and refuge from the snow and cold. He turned out to be a Mr. P—— of Montreal, who had left that town "for its good and my own health," and

who before morning, while the others still slept, had silently stolen away.

On the afternoon of January 23, the overland journey was begun. That morning the personnel of the party had been increased by the addition of Ah Chung, a Chinese cook, who made his appearance at the camp and wanted to "ketch 'em lide to Prescott." The night was spent on the edge of a rocky canyon several miles south of Ash Fork. On the second day, the caravan reached Sweetwater, a small station on the railroad and from this point Cushing proceeded to Prescott via train. The wagons arrived the day following and a short rest was called before the entire party was to set out for the south.

Before leaving Prescott, then the capital of territorial Arizona, a Shutler wagon was added to the transportation equipment, the capacity of the original three wagons proving too limited. On January 31, 1887, a start was made for Phoenix, via the freight route through the Black Canyon. Repeatedly, the caravan was mistaken for a "circus" or "menagerie outfit," and on the evening of February 8, 1887, the party arrived in Phoenix, pitching camp on the outskirts of the town. The following three days were spent in making repairs to equipment and shopping, and on the 12th the party departed for points up the Salt River Valley. Less than 4 miles had been covered before they encountered a large cluster of artificial mounds on the ranch of Herbert Patrick, a surveyor. These were hastily examined and adjudged to be of sufficient interest to warrant further study. The trail was taken up again with the hope of finding more sites and with the purpose of locating a suitable centralized camping place. This was ultimately found on a terrace on the north bank of Salt River just across from Tempe, and soon, "Camp Augustus" — named in honor of Mrs. Hemenway's son, was established.

Then, taking their chances between the winter showers, short excursions were made out to various points of interest in order to become thoroughly familiar with the region. On February 21, the first ground was actually broken on the ruin seen when the party left Phoenix. This they named "La Ciudad de los Pueblitos."⁴ Then followed further days of ex-

⁴Recorded by Turney as "Ciudad Phoenix." Turney, 1924, pp. 6-7.

ploration. "El Pueblo de los Hornos," "El Pueblo del Patricio" were visited, both ruins having a large mound located more or less centrally with respect to smaller outlying mounds, and on February 27, they were led to a large group of mounds later named "El Pueblo de los Muertos." Three days elapsed before the entire party returned to this ruin armed with shovels to test some of the mounds for what they might produce. Almost immediately, adobe walls were encountered in one mound and nearby several earthen jars containing cremated human bones were found. The day's probing had been so successful that Los Muertos offered itself as the logical site for the further elucidation of the questions which had arisen during the course of the reconnaissance.

Turning now to the final pages of Cushing's manuscript in which he includes some of his more general observations, he continues: "I had now not only superficially examined, but also to a slight extent excavated in Los Pueblitos, Los Hornos, and at Los Muertos—the latter apparently the richest and most interesting of them all. The striking results of the day's excavations had confirmed nearly all of my previous observations . . . and I was now desirous of formulating for the commencement of our more careful investigations, plans based upon some more general idea of the extent and distinguishing characteristics of these ancient ruins of the Salado and Gila regions, and this general idea was made possible by the following lesser considerations:

"These ruins, as compared with those of the north, were vastly more extensive, offering in this respect alone evidence of greater if not of further advanced ancient population.

"Each particular mound in any given one of them—and this would especially apply to the great central mounds—was more readily comparable with the typical ruins composed of closely massed small houses or ruins in the north than were entire groups of them.

"It had been held hitherto by writers on our southwestern ruins that these ruins of the farther south were not much more extensive than those of the north, and that the major portion of the pueblos here found were included within what I had found to be merely the great temple or citadel structures in the

center of each cluster of little pueblos or house groups.

"It had also been held that, these great central structures, as I now found them to be, were not only Pueblos, but that they had been reared upon artificial platforms or terraces, whereas our excavations of this (the first) day had made evident the fact that the seeming terraces upon which they had been constructed were formed by the destruction of enormous walls. . . .

"The merely superficial but careful observations we had been able to make of the extent of these groups of mounds clustered around any one of the great central mounds had evidenced the fact that each cluster covered an area of rarely if ever, less than a square mile in extent and often a very much greater area.

"We had also determined not only that the lesser and more regular mounds, at first thought to be refuse heaps, were indeed pyral mounds, and afforded abundant evidence of the practice ceremonially and with sacrifices, of cremation. Yet within the house-mounds we had found not only walls, but near to them, in one case, a burial.

"It seemed probable, moreover, that each great house-mound, or at any rate each great group of house-mounds within a given cluster would prove to be possessed of a pyral mound. . . .

"I had determined, from the examination of the lines of water-stones and the suggestion of little altars of eroded and highly colored river boulders that extensive irrigation works had been made and used by the dwellers in those ancient cities, single systems serving, it appeared, for more than one town. . . .

"It was plainly evident, therefore, that I could not better serve the intent of the Expedition in the massing of collections and the gathering of facts calculated to throw new light upon Southwestern archaeology, than to make, even at the expense of great delay in our progress back northeastwardly toward the Zuni country, a very thorough examination of this southern system. Our plans for this, afterward considerably enlarged upon, but not greatly modified, were therefore laid out at this time in about the following form":

With this the manuscript comes abruptly to a close and we are forced to reassemble bits of

information that have been picked up here and there for the completion of this historical account of the Hemenway Expedition. Apparently work started at once on Los Muertos with the aid of several Mexican laborers and was continued without interruption here and on ruins to be mentioned later, for a period of about fifteen months. To be nearer the seat of operations, Camp Hemenway was established at the very edge of the Los Muertos group. Late in May or early in June, 1888, the work in the Salt River Valley was brought to a close and the Expedition moved to Zuñi to continue excavations in Halonawan and Heshotauthla.

A few further notes are obtained from entries made by Mr. Sylvester Baxter during his secretarial duties. Mr. Cushing's continued ill health made medical aid imperative, so that on September 3, 1887, having been directed there by Mrs. Hemenway, Dr. Washington Matthews, then surgeon in the United States Army, arrived at Camp Hemenway. During his stay on the grounds of excavation he noticed that no effort was being made to preserve human bones which were coming to light in the burials of Los Muertos. He therefore communicated with Dr. John S. Billings, Curator of the Army Medical Museum, suggesting that Dr. J. L. Wortman be sent out equipped with the necessary preservatives to take care of the bones as they were removed from the ground. In accordance with this request, Dr. Wortman arrived at Camp Hemenway in November and subsequently supervised the removal of the burials. The bones were sent to the Army Medical Museum where they were studied, forming the subject matter of a report which appeared in 1893.⁵ More recently the custody

of the skeletal remains passed into the hands of the Division of Physical Anthropology, United States National Museum, of which the late Dr. Aleš Hrdlička was curator. In a recent paper,⁶ Dr. Hrdlička has brought out additional cranio-metric observations.

On November 7, 1887, Dr. Herman F. C. ten Kate arrived at Camp Hemenway from the Hague, Holland, to join the force as physical anthropologist. He later published some of his observations made among the Pima Indians.⁷

The late Mr. Sylvester Baxter, home secretary of the Expedition, went to Arizona in January of 1888 and remained with the field party until the end of May, when the camp was moved to New Mexico. During his stay at Camp Hemenway, Baxter wrote, "The Old New World," which appeared in the *Boston Herald* of April 15, 1888, and also as a reprint in the same year. This pamphlet gives an account of some of the discoveries the Expedition had made up to that time.

Unfortunately, the fulfillment of the proposed program of research was not to be realized. After somewhat over two years of intermittent work in the Salt River Valley, Arizona, and on ruins near Zuñi, New Mexico, continued illness and complications forced Mr. Cushing's retirement as director of the Expedition. Dr. J. W. Fewkes soon thereafter became the active leader and directed the work along ethnological lines, particularly among the Hopi. This eventually resulted in a long series of papers.⁸ For a time Dr. Fewkes contemplated the publication of the results of the excavations in southern Arizona, but other duties prevented him from realizing this desire.

⁵ Matthews, Wortman, and Billings, 1893.

⁶ Hrdlička, 1931.

⁷ ten Kate, 1892.

⁸ Gilman and Stone, 1908.

THE SALT RIVER VALLEY

ENVIRONMENTAL BACKGROUND

ONE of the prominent streams in southern Arizona is Salt River, the lower reaches of which flow through a wide, flat valley forming the heart of Arizona's present agricultural resources. The headwaters of Salt River are in the White Mountains of east-central Arizona whence the stream takes a westerly course through extensive mountainous territory, finally breaking out of the barrier to course into the agricultural land before joining the Gila River southwest of the city of Phoenix. From our standpoint, only the lower and more arid part of the drainage is of interest since it was here where the Hemenway Expedition did its work. The elevation above sea level in the central part is approximately 1100 feet and the adjoining volcanic mountain ranges scarcely exceed 2600 feet in elevation and not high enough therefore to support growths of coniferous trees. The mountains within easy access from Los Muertos are the Salt River Range a few miles to the west and the Phoenix Range due north of the latter across Salt River (fig. 1). Tempe Butte, a solitary hill just north of the town of Tempe is a prominent landmark of the valley.

The daily temperature may be as much as 60 degrees, but seasonal fluctuations are proportionately not so marked. The intense summer heat, sometimes reaching a maximum of 118 degrees, is made less oppressive than one might suspect by a relatively low humidity. Winters are tempered by many sunny days and a minimum of temperature only occasionally reaching the freezing point. Citrus fruits, dates, olives, and cotton are successfully grown at the present time.

The flora consists mainly of heat and drought resisting plants as cactus, mesquite, catclaw, palo verde, creosote bush, and salt bush. The stream banks support such trees as cottonwood and ash. Mammal life is confined to smaller animals as the coyote, jack rabbit,

cottontail, and numerous rodents. Formerly deer and mountain sheep frequented the higher and more extensive mountain ranges, but few remain at the present time. The region in general was relatively a poor provider of natural vegetal and animal foods.¹

The annual rainfall, approximately 8 inches, is not enough to permit dry farming. Irrigation, therefore, is a prerequisite to successful agriculture. Inasmuch as the mountain ranges are not closely spaced, the intervening areas are normally quite level and usually not greatly dissected by washes and streams. The flat character of the country bordering the water courses and the relatively shallow channels of the permanent streams were the physical requirements for the development of irrigation systems. The soil, gravelly in spots, is mostly of a quality capable of producing large crops, larger than the native vegetation would forecast.

Since springs are almost wholly lacking in the region, and as a sufficient supply of rain-water for domestic use could not be stored to last through the dry seasons, it was necessary either to settle near the permanent streams, or, if the villages were located at some distance, to provide a means for getting water to the community. A favorite place for settlements was along the irrigating canals, sometimes as far as 6 miles from the river. Such a location had the combined advantage of bringing the water literally to every door step, and of placing the community in the heart of the farming district where fields could be tilled and watched without going far from home.

Except for rounded boulders in the beds of water courses and the jagged lava blocks of the hills, good building stone was not to be had. This deficiency was undoubtedly the factor which led to the great use of adobe as a building material. Caliche, a calcareous formation peculiar to the arid regions, when mixed with the local clay or adobe, was capable of being formed into walls of great durability.

data on this region as it affects the present Indian population.

¹ See also Hoover, 1929, for further physiographic

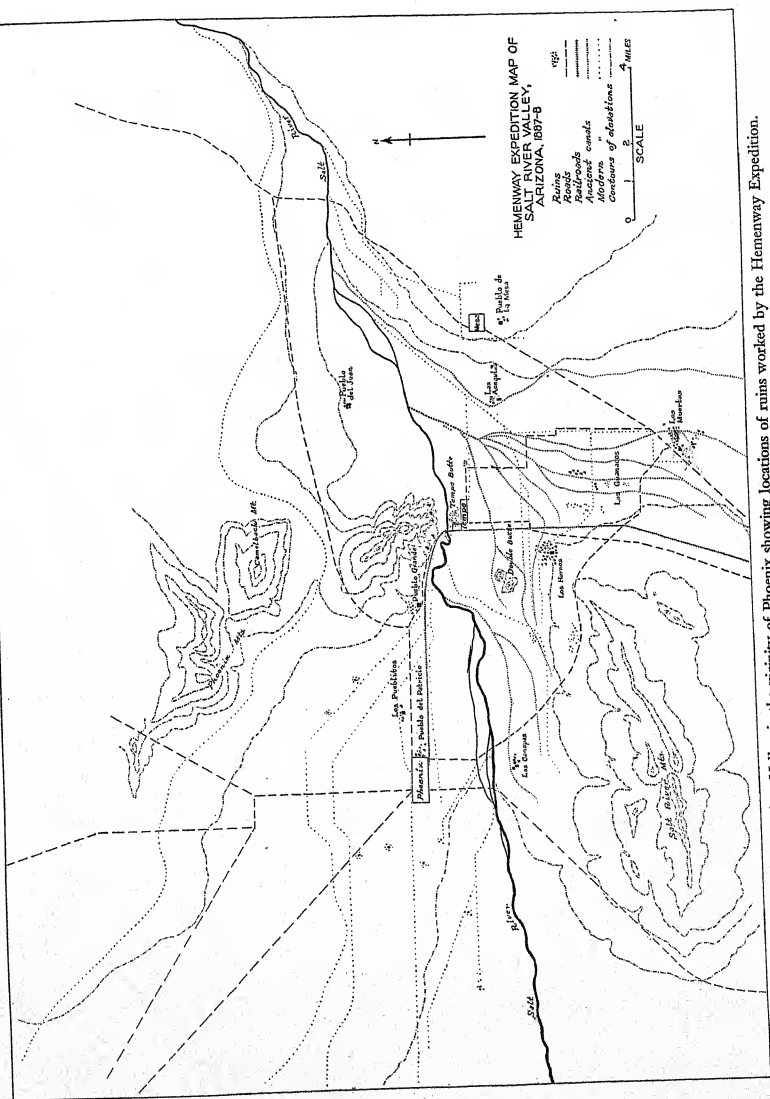


FIG. 1. Map of Salt River Valley in the vicinity of Phoenix showing locations of ruins worked by the Hemenway Expedition.

ARCHAEOLOGICAL BACKGROUND

The Hemenway Expedition's work in the Salt River Valley was in truth a pioneering effort. Neither here nor in the adjoining Gila Valley had any systematic work of any sort been done. Although seen by some of the early Spanish explorers and recognized as ancient villages by the first white settlers, the ruins were given little more than passing attention and many were sacrificed in those early days of reclamation. An appreciation of the Indian's accomplishments came first through the recognition of their canal systems, for the white settlers busy in constructing their own irrigating systems were spared many hours of labor in some cases by clearing out the ancient ditches. The first systematic recording of these canals was done by Patrick, an engineer, who for twenty-five years continued with this interest eventually publishing a map of the canals.² Then followed a reconnaissance by Bandelier³ in the early 1880's and Cushing and his party in 1887. From this date on until 1925 the writings of Mindeleff,⁴ Moorehead,⁵ Turney,⁶ and Fewkes⁷ constitute the main contributions to the archaeology of these adjoining valleys. Schmidt's stratigraphic investigations⁸ in 1925 were the basis for the first chronology in the area and these were later added to by the work of Gladwin.⁹ Since 1930 much detailed and significant work has been done, the backbone of a long chronology having been established through the efforts of Gila Pueblo at Snaketown.¹⁰ Recently the explorations of the Pueblo Grande Laboratory near Phoenix¹¹ have added useful information to our knowledge of the late prehistoric

period — the time represented by most of the Hemenway material. Studies in the neighboring areas as at Tucson, in the San Pedro Valley and in Papagueria¹² directly supplement the archaeology of the Gila-Salt area. On the strength of all this work it has become possible to fit the various classes of artifacts in the Hemenway Collection into the proper chronological niches and to evaluate the lot more specifically with respect to cultural affiliations.

Until a few years ago it was felt that the archaeology of southern Arizona was Puebloan in character. With increasing work more and more departures from the Pueblo pattern were found which led ultimately to the belief that two culture groups and not only one were to be reckoned with.¹³ There appeared to be, on the one hand, a native group whose members lived in shallowly excavated houses, oval or rectangular in form and covered with earth; who were agricultural, having developed large irrigation systems for the promotion of the same; who made a buff colored pottery with the paddle-and-anvil and decorated it with a maroon-red paint; but who did not make corrugated ware. They possessed cotton, the slate palette, the three-quarter grooved axe, and they carved shell extensively, and cremated their dead. Because of this latter practice, there was no sure evidence as to their physical type. On the other hand, there were people, who, being newcomers at a relatively late date and differently constituted culturally, brought new traits into the area. They were accustomed to building communal houses of several stories; they also lived by agriculture but did not make general use of the extensive irrigation canals in their former home, their pottery

University of Arizona (Hayden, J., in preparation); in the Tres Alamos site in the San Pedro Valley by the Amerind Foundation of Dragoon and in the San Simon village by Gila Pueblo; and the work in four sites on the Papago Indian Reservation by the Department of Anthropology, University of Arizona (Scantling, 1940; Withers, 1941; Haury, in preparation).

¹² Gladwin, 1928, p. 27; Schmidt, 1928, p. 281. Upon the conclusion of his work at La Cuidad and Pueblo Grande east of Phoenix, Schmidt felt that it was premature to say whether the new elements were due to diffusion or to invasion, but became convinced that the latter was the case after reviewing the Hemenway Collections in the Peabody Museum. Also see Kroeber, 1928; Gladwin, W. and H. S., 1929a, p. 37.

² Patrick, 1903.

³ Bandelier, 1892.

⁴ Mindeleff, 1896b.

⁵ Moorehead, 1906.

⁶ Turney, 1924.

⁷ Fewkes, 1907, 1912.

⁸ Schmidt, 1928.

⁹ Gladwin, 1928.

¹⁰ Gladwin, Haury, Sayles, and Gladwin, 1937; see also Gladwin, W. and H. S., 1929a, 1929b, 1930a, 1930b; Gladwin, 1930.

¹¹ Schroeder, 1940.

¹² Excavations in the Hodges Ruin near Tucson by Dr. I. Kelly (in preparation), in the University Indian Ruin by the Department of Anthropology of the

was made by coiling, and the decorations in red, black, and white follow a manner different from that of the first group; they buried their dead, often below the floors of the houses in which they lived, or in the plaza outside, placing with the bodies the vessels manufactured by potters of their own kind. The head form was brachycephalic and showed a pronounced occipital flattening. In some parts of the area at least, these two ethnic groups appear to have lived amicably side by side, although the fraternization did not lead to the emergence of a single hybrid culture. Nevertheless, the association produced the greatest archaeological monuments of the region. After a time, the centers of population disintegrated, the alien group withdrew, and what happened to the original occupants is still to be determined.

It is now known that the former of these two groups, the Hohokam Culture of recent archaeological literature,¹⁴ was in the area for a long time, and that the latter, the Salado Culture,¹⁵ responsible for the Puebloan traits, paid the region a transient visit in late prehistoric times.

As it now stands, the sequence of periods and phases, derived largely through Gila Pueblo's work at Snaketown in the Gila Valley, may be outlined as follows:¹⁶

PERIOD	PHASE
Classic	{ Civano
	{ Soho
Sedentary	{ Santan
	{ Sacaton
Colonial	{ Santa Cruz
	{ Gila Butte
Pioneer	{ Snaketown
	{ Sweetwater
	{ Estrella
	{ Vahki

It should be pointed out that the recent end of this chronology, the Civano Phase, was the time of the Salado occupation, which ended according to the best means of dating, at about 1400 A.D. As most of the Hemenway material may be allocated to the Civano Phase, further justification for this dating will be given later, and we are not immediately concerned with the dating of the phases prior to that time.

One further point should also be clarified, namely, that this chronology, established for the ruins of the Gila Valley, also applies to the ruins in the valley of the Salt. This was determined in the course of a stratigraphic survey of trash mounds in the area in 1938-1939.¹⁷ We may therefore confidently proceed in using the Gila chronology in the study of the Hemenway material.

From the dozen or so ruins studied by Cushing enough material was not always obtained to permit one to place them chronologically, at least insofar as the full range of occupation is concerned. Usually it is possible, however, to say during which phase or phases the occupation appears to have been most intense. Bearing this latitude in mind, the following placement of the Hemenway ruins¹⁸ in the chronology should be of assistance to the reader:

Ruins predominantly Classic Period (Civano Phase):

Los Muertos
Las Acequias

Ruins primarily of the Colonial-Sedentary Periods with some Classic Period material present:

Los Hornos
Las Canopas
Del Patricio
Los Guanacos

¹⁴ Although this term was used by Fewkes (1912, p. 153), it was applied without discrimination to both cultural groups in question.

¹⁵ Gladwin, W. and H. S., 1930c, pp. 3-11, 1931, pp. 46-49.

¹⁶ Gladwin, Haury, Sayles, and Gladwin, 1937.

¹⁷ Schroeder, 1940, p. 17.

¹⁸ Only the major ones are listed. Others tested by the Expedition are included at the end of the descriptive section of the report.

CLASSIC PERIOD SITES

IN MANY ways the Classic Period of Hohokam development is the most interesting in the entire history of the culture because of the arrival in the valley of an increment of Pueblo people—the Salado Culture—from some point to the north and east of the Salt River Valley. The innumerable questions pertaining to this movement have not been fully answered even by the most recent archaeological work. Nor does the Hemenway material go far in clearing this picture other than to suggest the simultaneous use of the villages by the two groups of people, a situation which has previously been recog-

nized,¹ but is not wholly in accord with some of the most recent findings.²

The two phases of the Classic Period differ chiefly in that the earlier (Soho) represents the Hohokam prior to the Pueblo invasion while the later (Civano) phase takes into account the actual presence of Puebloans and recognizes certain traits new to the area brought by them as, for example, a more pretentious form of architecture, a polychrome pottery, and earth burials. The most important work of the Hemenway Expedition, at Los Muertos, was in remains belonging to the Civano Phase.

LOS MUERTOS

GENERAL DESCRIPTION

El Pueblo de los Muertos, often abbreviated to Los Muertos, and meaning the "City of the Dead" has figured frequently in archaeological literature by way of reference but seldom as regards any specific details, due to the lack of definite knowledge about it. The village received its name from the fact that remains of the dead, both cremated or inhumed, were very abundant. It was situated about 6½ miles south of the present town of Tempe in a large, open, and fertile plain (fig. 1). Today the nearest supply of permanent water in any abundance is Salt River, which flows along the northern edge of Tempe. It is clear that by the time Los Muertos was founded, the building of canals for irrigation was a well-established art, otherwise the village could not have existed where it did. The problem of domestic water was solved by directing a part of the flow in Salt River to the village through hand-dug ditches.

The Hemenway party was led to this ruin on February 27, 1887, by Mr. James C. Goodwin, a nearby resident. Turning to Cushing's unpublished manuscript for further details: "... We came out upon a slightly elevated section of land where the mesquites grew less

frequently. Standing there above the tree tops high and grand was a great reddish-yellow mound. . . . On visiting this mound I found that while not so high or quite so extensive as either the temple mound at Los Pueblitos or at Los Hornos, it was even more evidently made of the debris of a once lofty and massive structure. Nor had any excavation been done here or in any direction around about with the exception of two small holes which had been dug by Mr. Goodwin and his brother. . . . A survey of the surrounding country from the summit of this mound, so far as the mesquite trees would admit of it—particularly toward the northeast and off to the south-southwest—displayed long ranges of what I had come to designate house mounds, but what seemed here, even more than in other ancient city sites, mere natural elevations. Between these house mounds might be seen on every hand, as far as the eye could reach, the peculiar gray well-burrowed mounds of dark ashes and burnt objects. These were here far more elevated and marked than in any place yet examined by us. . . ."

Beginning a general survey of the area, Cushing went to a mound lying to the northwest of

¹ Gladwin, 1937, p. 104.

² Schroeder, 1940.

the great mound (Ruin I, fig. 2), and then he continues: "... To the east of this elevation stood two very broad and quite prominent mounds of the refuse kind. The farther one showed a slight depression in the center—evidence that it marked the site of a subterranean *horn* or oven, like those of Los Hornos; the other was absolutely paved, so to say, or tiled with potsherds, and along its southern side and circumference literally be-

over the mouth like a thatch, was revealed." Almost immediately they found "... yet another and larger jar, similarly placed, standing upright, covered with sherds like the first, and seemingly buried in soil which had been wetted or else in a foundation of mud which had been provided for it. There were traces around the latter specimen indicating that the potsherds with which it was closed, had been plastered in with mud. Yet another vessel was unearthed

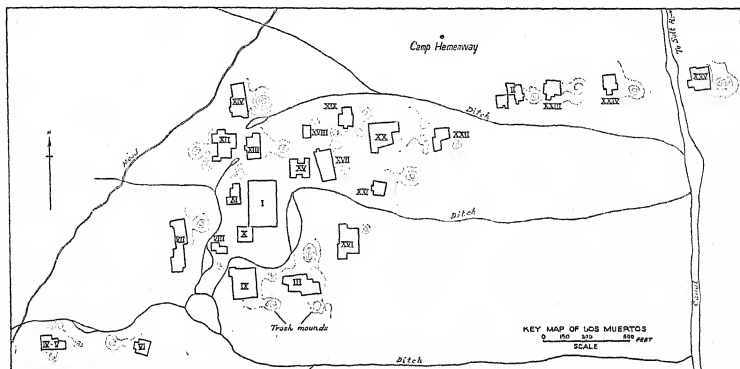


Fig. 2. Map giving the locations of house units in Los Muertos excavated by the Hemenway Expedition.

strewn with burnt human bones and calcined fragments of shell ornaments and amulets.

"The most cursory examination of this mound convinced me that it and the mounds of which it was so fine an example marked the spot, as I had begun to suppose, where cremation of the dead and sacrifices to them were practiced."

A few days after this initial visit, the party returned prepared to make further tests by excavating. Digging was started at two places: the first along the south edge of the refuse mound noted above with scattered burnt human bones (probably the trash mound of Ruin XVII) and the second place at the southern edge of the great central mound (Ruin I). Shortly, in digging at the first station, "a beautifully formed, medium size jar, carefully covered with chipped sherds of pottery laid

a few moments later, almost in a line with the two preceding, and at its edge another. ..."

Next, directing the workmen to extend the trench in which the cremation jars were found towards the house mound, they shortly struck a wall "regularly constructed of very strong cement-like material (adobe), plastered outside and in. This wall was nearly eighteen inches thick at this point and was revealed at a depth of less than six inches from the surface. ... A few moments after this discovery was made, Jesus (one of the workmen) came to inform us that he had discovered an enormous *pared* ... or foundation wall at the beginning of the slope of the top of the southern end of the central mound, and that this wall, which seemed to run across the mound, was connected with another extending into the middle of the mound and equally if not quite a few

inches of which had been exposed by the digging which was extremely difficult, were three or four times as massive as the house wall I have described, and that they had been carefully plastered by hand as shown by the finger marks seen here and there particularly on the inside."

On this same day, Cushing examined a short distance west of the central mound "some lines of black and colored stones" which he believed indicated the presence of irrigating canals. He continues: "... I discovered not only that these stones extended in long lines, double in most places, southward, seeming to thread their way between many other house mound elevations, but that also between them and the house mound was a great depression which must have served either for supplying adobe or cementaceous material for the building of the houses which had once occupied this site, or else for water storage or reservoir purposes. ... At any rate the water stones — as I temporarily termed them — were especially abundant near this sunken area, particularly at one point where it seemed to touch the supposed irrigating canal. Following this southward I found that it skirted other house mounds quite a distance south of the great central mound, and that some of these were even more extensive than the one we had begun to excavate. ..."

This canal examination brought to a close the second day at Los Muertos. For the events of the succeeding months of excavation, we are left to our own surmises as there are no written records to carry the story along.

Judging from the Expedition's maps, and taking into full account the many ruins of the area, Los Muertos appears to have been the largest village in all of the lower Salt River Valley. Larger individual mounds occurred, as at Pueblo Grande, but there were certainly no more extensive groupings of house clusters. In this respect it surpassed even the famed Casa Grande, in the valley of the Gila 35 miles to the southeast. The key map of Los Muertos (fig. 2)³ indicates twenty-five mounds which were partially or wholly explored by the Ex-

pedition. In the traverse books, rough measurements were included of several others, the highest number being thirty-five, although these were not excavated and mapped with respect to the other units. Turney indicates on his map⁴ of the prehistoric irrigation systems of this region that Los Muertos had thirty-six communal buildings and innumerable smaller houses. The area covered by Los Muertos is said to have been from 5 to 6 miles in length and $\frac{1}{2}$ to 1 mile in width. The chief cluster of twenty-five buildings on which the Hemenway Expedition worked extended over an area approximately 1 mile in length east to west and $\frac{1}{2}$ mile in width north to south.

The ruin units themselves are irregular as to size and shape and apparently bore a meaningless relationship to each other. The community evidently depended on numbers for strength in case of attack as the topographic features offered no resistance whatever to a hostile party; although the arrangements of the buildings show no tendency toward crowding. The nearest mountains were some 5 miles to the west. Cushing notes that the Los Muertans must have had nothing to fear as invaders could with little difficulty divert the water supply out of the canals and deprive the village of this essential. A fairly large supply of water, however, could have been stored in reservoirs which were scattered through the settlement.

The orientation of the house units, where there is a long axis, usually extends north and south, the one notable exception being Ruin III. This arrangement also holds for most other kindred villages but it is not universal.

Thanks to the addition of a trained surveyor to the Expedition's staff, a series of excellent plans of all major units excavated in Los Muertos is available. These are now of double value: their completeness of detail has assisted in the organization of the material in the absence of field records; and they give us our sole knowledge of the size, shape, and structural composition of the units of Los Muertos. Los Hornos, Las Canopas, and others, have been sacrificed by thrifty farmers who leveled them with team and scraper to provide a few

conform more closely to the contours on the detail maps.

⁴Turney, 1924, pp. 6-7.

³This map has been redrawn for purposes of correcting the outlines of the ruin units to make them

additional acres of tillable land. On revisiting the site of Los Muertos recently, scarcely a sherd or other vestige of this one-time extensive settlement could be found.

The maps of the various units are given in the following section. Beyond pointing out certain salient features, they will have to speak for themselves, as they are unaccompanied by

written field observations. Some of the original maps themselves are crowded with jottings as to the locale of artifacts recovered. These have necessarily been omitted. The maps show the extent of the diggings in each case, revealing the layout of the houses, the position of the burials and of the trash mounds with the adjacent cineraria.

ARCHITECTURE

Ruin I. In Ruin I⁵ (fig. 3) of Los Muertos, the Hemenway Expedition found its largest single building. While the mound was not completely excavated, its general character is well disclosed by the trenches which laid bare many of the walls and by the more extensive diggings in clearing the debris from the rooms. This unit occupied a position fairly central in relation to the rest of the outlying buildings. Because of its size and character Cushing considered it to be the main structure about which the life of the community revolved. Some idea as to the setting in which Ruin I was found may be had from one of the Expedition's views reproduced in plate 1.

The outline of Ruin I was rectangular, the longitudinal axis being north and south. According to the field data in the traverse books, the dimensions were: east-west, 200 feet;⁶ north-south, 320 feet. This area was bound on all four sides by a massive adobe wall which attained a thickness in spots of 7 feet⁷ (fig. 4). As to its height, one can only speculate. It probably was not as high in proportion to its thickness as were some of the house walls. The height of the surrounding wall of Compound A of Casa Grande, as reconstructed from a fallen section, was 7 feet⁸ and its thickness was from 2 to 4 feet.

This massive earthen wall held within its enclosure a large adobe structure, lesser secular rooms, and plazas. The first of these, in the north end of the enclosure, before excavation stood as a rounded mound which rose about

15 feet above the surrounding plain, and formed the most conspicuous part of all of Los Muertos. As excavation proceeded, this mound developed into a rectangular structure measuring 80 feet in width and 120 feet in length, its axis running north and south. It will be seen on the map of this ruin unit that the outer wall of the structure which Cushing regarded as a temple reached the great thickness of 7 feet in thickness. Cushing estimated the height of this and similar structures to be from four to seven stories.⁹ There is no reason for believing, however, that buildings of more than four stories were ever put up in southern Arizona. Casa Grande has this number but the lowermost was intentionally filled with earth and, consequently, never occupied.

Recent investigations¹⁰ have shown that the large mounds of the Gila-Salt area, constructed of earth within massive retaining walls, were put up during the Soho Phase and that on the tops of the platforms, the flimsy structures of the Hohokam were erected. Often times these were added to or partly built over by the Salado during the Cívano Phase. While we are at a disadvantage in interpreting the Los Muertos mound because the maps show no sections, that a similar situation prevailed here is indicated by the flimsy character of the partition walls which could not have supported the weight of more than one story, by the pole structure in the central part of the mound, by the pole re-enforcing in the east wall which appears to be a pre-Cívano device

⁵ For the location of all house units see fig. 2.

⁶ While it is the policy of the Peabody Museum to use the metric system of measurement, all the Expedition's work was done in the English system which is, consequently, adopted for this report.

⁷ Cushing (1890, p. 163), generalizing on the point, says that these walls vary from 5 to 10 feet in thickness.

⁸ Fewkes, 1912, p. 38.

⁹ Cushing, 1890, p. 163.

¹⁰ Schroeder, 1940; Hayden (in preparation).

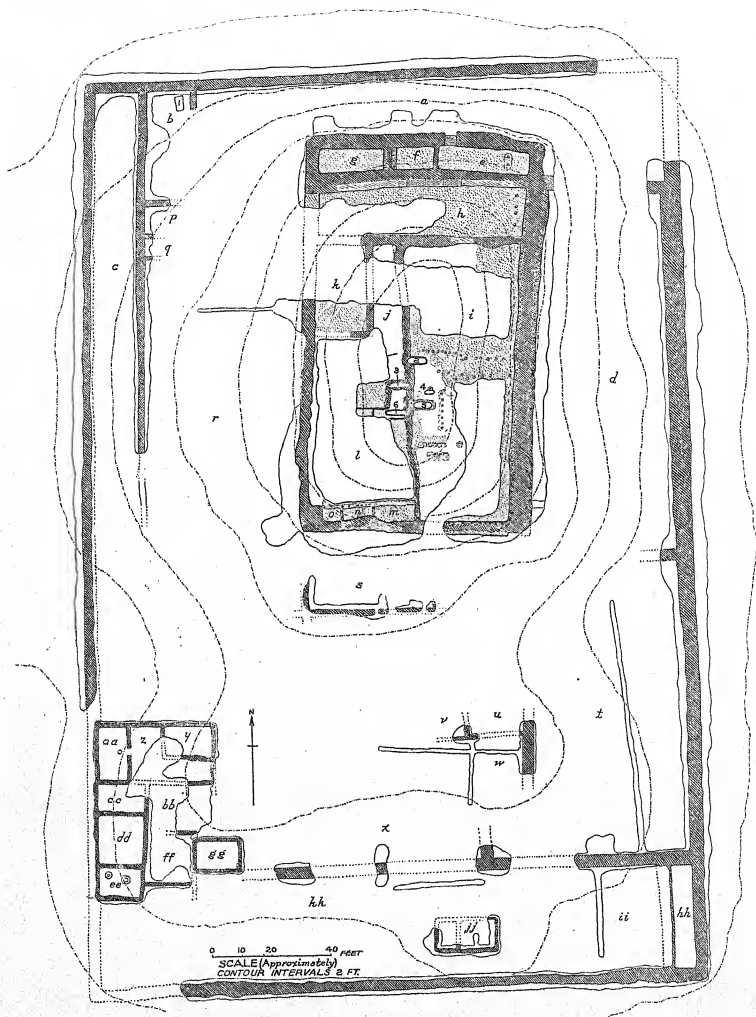


FIG. 3. Los Muertos. Plan of Ruin I.

primarily, by what appears to be a late addition on the north end of the Pueblo-like rooms, and lastly, by Salado burials in the central part which apparently cut into some of the older walls.

The rest of the enclosure of Ruin I was divided into what may be considered plazas and small room clusters, the chief of which was located in the southwest corner. The significance of such small narrow rooms, as *q* and *bb*, is difficult to see, but when it is remembered that these adobe structures were constantly undergoing remodeling, many of the

clusters and two plazas (*tt* and *xx*). The building units were joined by a wall forming the northern boundary of one and the southern boundary of the other unit. The incorporation of Rooms *uu* and *ww* into the eastern plaza wall is a feature which does not appear very often.

Of considerable interest are Rooms *mm*, *s*, and *ss*. The first is roughly oval and joined to Ruin II in an altogether uncommon manner; Room *s* seems to have been an oval structure of very thin walls, being situated independently of the adjacent rectangular rooms in what can

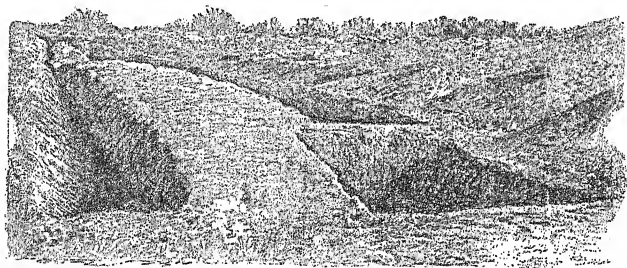


FIG. 4. Los Muertos, Ruin I. A section of a 7 foot thick enclosing wall. (From a photograph taken at the northeast corner, looking south along east enclosing wall.)

spaces which show up in the excavations were not willfully created.

Ruin I of Los Muertos is strikingly like Compound A of Casa Grande. The general plan and orientation is much the same although the dimensions of this enclosing wall of Compound A are somewhat larger, being about 220 by 420 feet; and the "big house" of Los Muertos is, almost to the foot, twice the size of the Casa Grande. In room arrangement the latter is more orderly, there being five on the floor plan.

Ruin II. Ruin II (fig. 5) was situated nearly 1800 feet east and slightly north of Ruin I. The dimensions of this ruin were roughly 195 feet east-west, by 165 feet north-south. While the greatest length thus trended from east to west, the axes of the plazas and the two house groups extended in the customary manner. A part of the ruin uncovered is shown in plate 2a.

The ruin consisted of two distinct house

be regarded as a court; Room *ss* is also oval, measuring roughly 12 by 28 feet, with a fire-pit located immediately in front of the entrance in the south wall. As to the significance of these, I can only venture an opinion. The Hohokam house of both Sedentary and early Classic Period times was precisely of this shape, having usually side entrances with fire-pits in front of the door. Some of these were but shallowly excavated into the sub-soil and the side walls were less substantially constructed than these appear to have been, excluding, possibly, Room *s* which apparently had frail walls. Since polychrome and red-on-buff pottery—the decorated wares of the Salado and Hohokam—was found in these rooms, as both inhumations and cremations occur in association with this and other ruin units, and since in addition there is almost certainly a survival of the native style of house within, or related to the Pueblo-like structure,

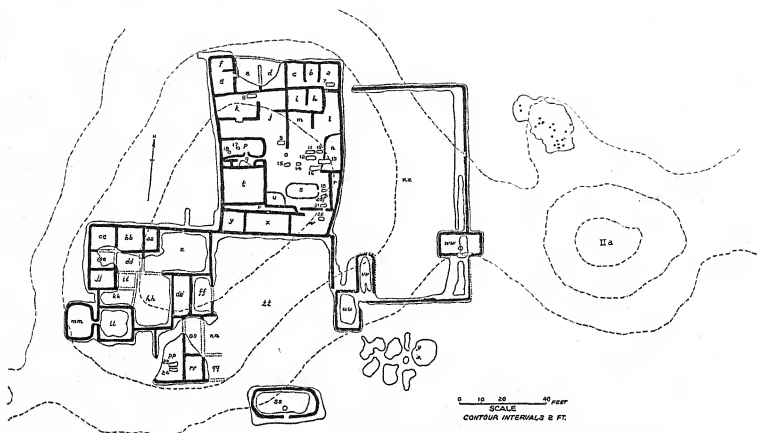


FIG. 5. Los Muertos. Plan of Ruin II. In this, and subsequent plans, rooms and plazas are indicated by lower case letters; burials by Arabic numbers; trash mounds by Roman numerals; and cremations in trash area are indicated by dots.

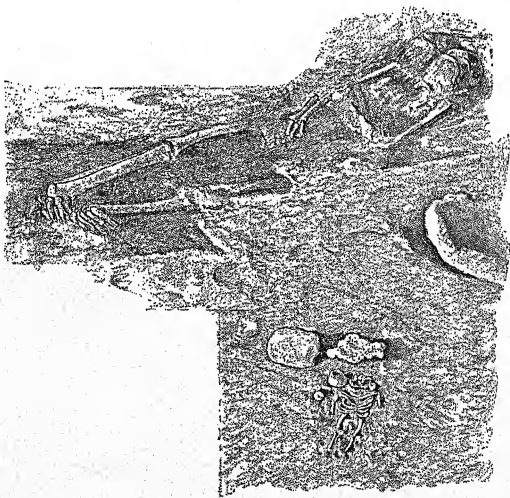


FIG. 6. Los Muertos, Ruin II. Skeleton of an adult and infant.

the suggestion that the two groups lived together is strong.

The distribution of the burials in Ruin II, as in nearly all others, is very spotty. They are grouped chiefly in the central northern wing in the court lettered *o*; two were found in Room *pp* of the southwest wing, and one in the southeast corner of Plaza *xx*. There existed thus, both house and court burials. Figure 6 shows an adult skeleton and a nearby infant interment. In all, about nineteen skeletons were encountered in this unit, including the double interment in grave sixteen. An equal number of cremations were found mainly in the north margin of the trash mound, which was located east of Plaza *xx*.

A shallow depression is recorded as having existed off the northwest corner of the north house group.

Ruin III. About 400 feet south and slightly east of Ruin I was the third unit of Los Muertos. It was elongated east to west, of irregular outline, and lacked the encircling wall of Ruin I (fig. 7). Several building "blocks" can be distinguished, possibly representing building periods. Units were separated in the northern part by a narrow runway *b*, the floor of which was of terraced adobe. The rectangular enclosure with rounded corners in Plaza *c*, again calls to mind the form of the Hohokam house. Rooms *n* and *z* each had a square pedestal of adobe 16 inches high of undetermined use, and Room *z* had a low bench of adobe in the northwest corner.

Ruins IV and V. These supposed two units, found to be a single house cluster as excavation progressed (fig. 8), were situated about 1500 feet southwest of the heart of the community. Compact and smaller than most (80 by 125 feet), it is chiefly interesting because of an area marked "granary" in the northern part of the "L"-shaped enclosure *b* and a so-called "pyral altar" in the eastern trash mound. Unfortunately, details on both of these features are lacking. One of the rooms, probably *f*, is shown in plate 2b.

Ruin VI. Ruin VI, east of IV-V, was small, consisting of only three rooms and a plaza (fig. 9). Extensive trenching failed to reveal cremations or burials.

Ruin VII. This unit (fig. 10), situated 600 feet southwest of Ruin I, extended over a considerable area on a north-south axis. Its total length is somewhat over 400 feet, although its breadth did not exceed 100 feet. The rooms were more loosely arranged than was customary, there being a number which were apparently entirely disconnected from the parent structure. Room *ii* is reported to have had "inward sloping walls" which is a Hohokam rather than a Pueblo characteristic.

Along the south wall of Room *j* there was a row of shells containing "white, red, yellow, brown, green, and blue paint and one contained asbestos."

In Room *k*, along the north wall at the point marked 35, there was uncovered a skeleton of a man caught beneath a collapsed wall (pl. 2c). This has been cited on several occasions as evidence of the destruction of the entire valley by an earthquake.

Ruin VIII. Field map and other data lacking.

Ruin IX. The original field map for this ruin seems to have been lost and a map, subsequently drawn from the original, is here reproduced (fig. 11). Room and burial numbers are not included. It is one of the better examples showing the use of the enclosing or compound wall.

Ruin X. Field map and other data lacking. There is some doubt as to whether this unit did or did not join Ruin I at the southwest corner.

Ruin XI. Ruin XI was a small unit, having not more than seven or eight rooms (fig. 12). It was located just outside the western enclosing wall of Ruin I at the north end. Its total length was but slightly over 100 feet north to south.

Ruin XII. Field map lacking. Dr. Hodge informs me that only the outer walls were bared sufficiently to reveal the outline and that complete excavation of this unit was not undertaken.

Ruin XIII. Less than 200 feet, directly north of Ruin I, was the well-ordered unit XIII. It measured roughly 100 by 130 feet, the long axis running north and south. The plan

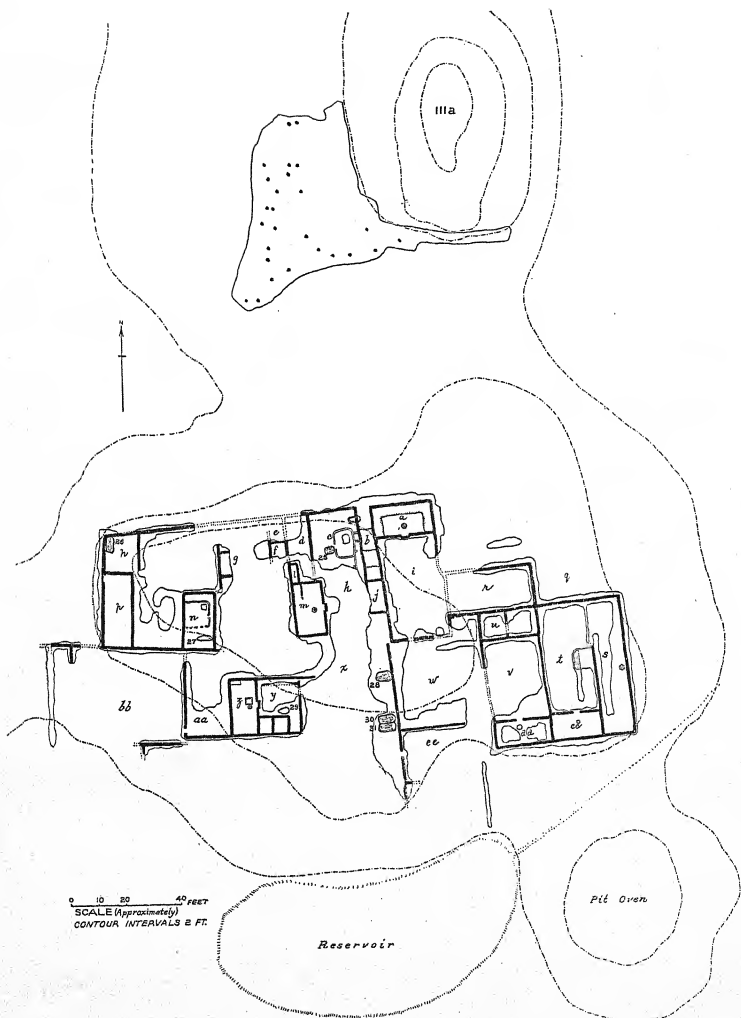


FIG. 7. Los Muertos. Plan of Ruin III.

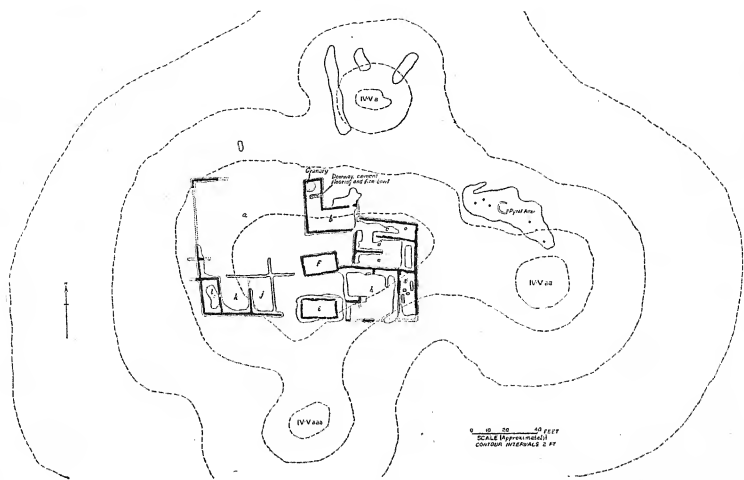


FIG. 8. Los Muertos. Plan of Ruins IV and V.

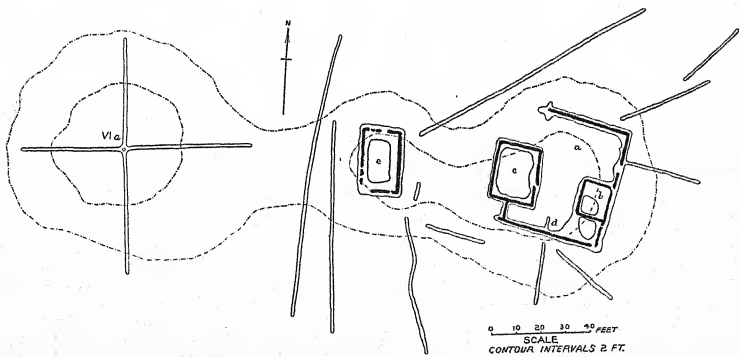


FIG. 9. Los Muertos. Plan of Ruin VI.

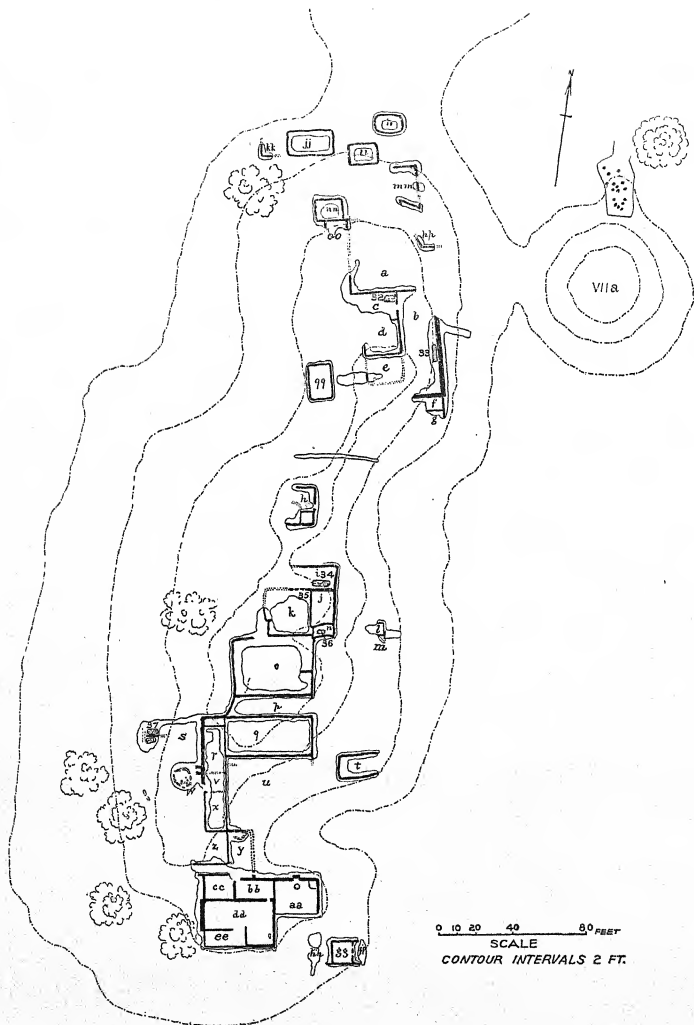


FIG. 10. Los Muertos. Plan of Ruin VII.

(fig. 13) shows a compact room arrangement within an enclosed wall. It is clear that the single tier of rooms along the west margin and the two northeastern rooms were added to the structure. This unit is typical of the architectural form of the late Classic Period ruins in the Gila-Salt region. It is also of interest because of four pits, presumably used as granaries, which are rarely found in the ruins of this area. Those in Room *b*, partially cleared of soil, may be seen in plate 2d. The southern one of this pair was ultimately used for burial,

as the expedition found four skeletons in it. Burials 44 and 53 are reported as having been double.

Ruin XIV. This unit was located some 150 feet north of Ruin XIII. Its longest dimension, as in nearly all others, extends from north to south, being nearly 250 feet long (fig. 14). It was one of the more extensive house clusters and all feeling of congestion was relieved by the numerous courts. Expansion again took place chiefly on the north and west margins by adding rooms outside of the compound wall.

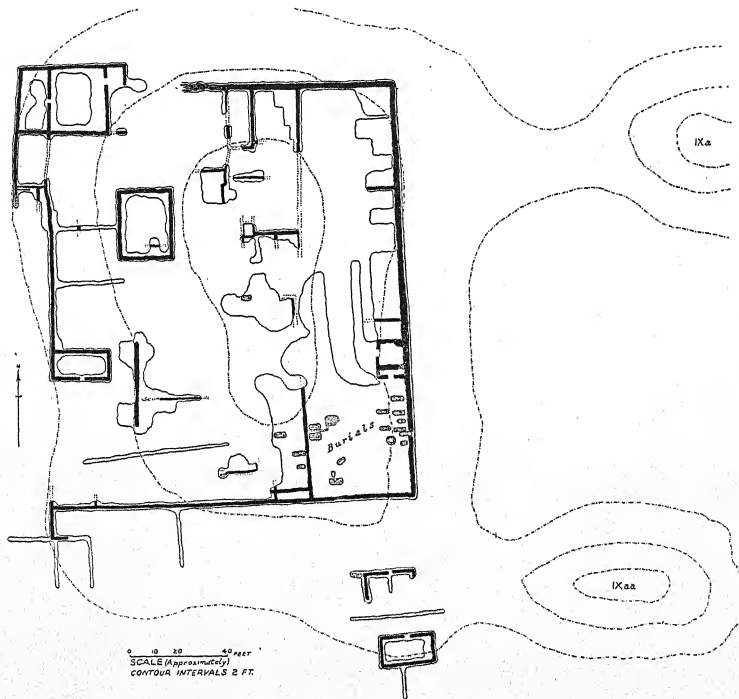


FIG. 11. Los Muertos. Plan of Ruin IX.

Although burials are not indicated, it is almost certain that they were found here. The cremation plot was situated at the south edge of the trash mound east of the ruin and seems to have been very productive of pottery and other remains.

Ruins XV and XVI. Field maps and other data lacking.

Ruin XVII. Ruin XVII, some 300 feet northeast of Ruin I, is a representative structure, 125 by 200 feet (fig. 15). Only one room, *e*, lies outside of the bounds of the compound

wall and those within are concentrated at the north end of the enclosure. The south end is given over largely to courts. A photograph of Room *t* will be found in plate 3a.

Ruin XVIII. Field map and other data lacking.

Ruin XIX. The small unit number XIX was situated about 600 feet northeast of Ruin I. Its total length north to south was less than 150 feet (fig. 16).

An "oven" to the west is indicated as having contained slag.

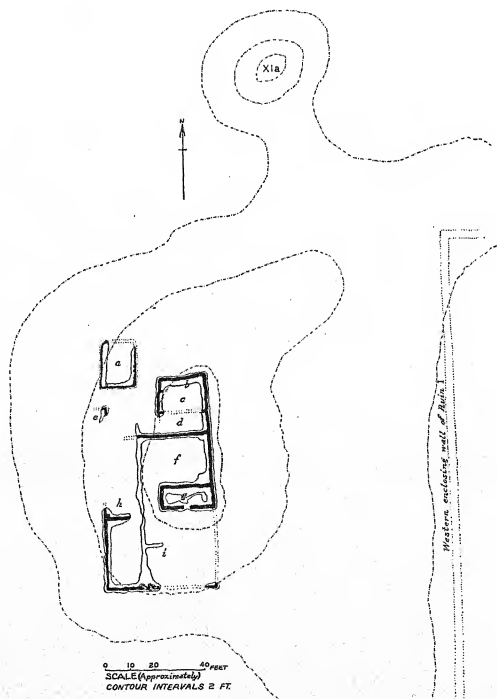


FIG. 12. Los Muertos. Plan of Ruin XI.

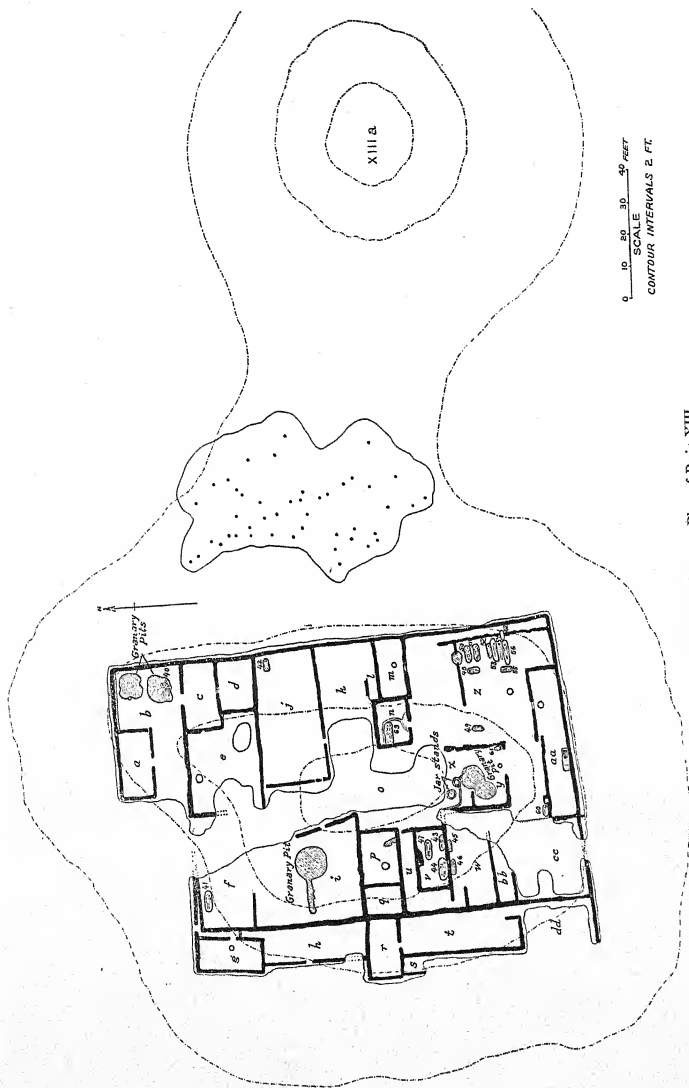


FIG. 13. Los Muertos. Plan of Ruin XIII.

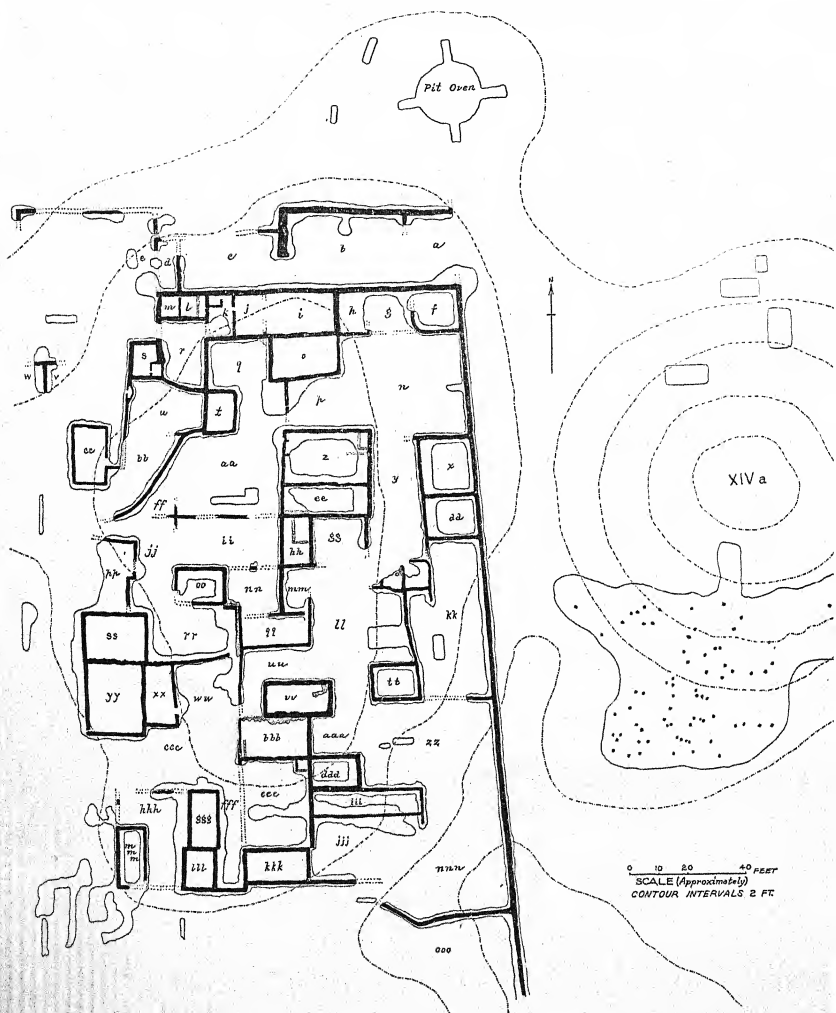


FIG. 14. Los Muertos. Plan of Ruin XIV.

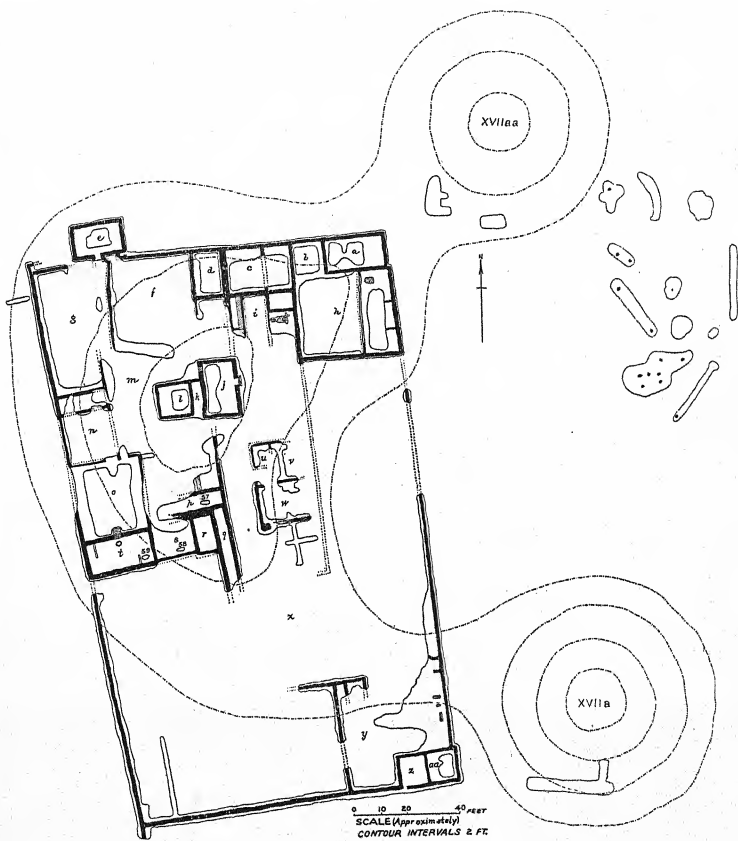


FIG. 15. Los Muertos. Plan of Ruin XVII.

Ruin XX. Ruin XX (fig. 17) lies southeast of Ruin XIX. It shares with Ruin III the distinction of being longer east to west (160 feet) than north to south (120 feet). In other respects it has no outstanding features. There was a single outlying room south of the trash mound, which, judging from the map, was not an adobe structure like those of the main unit,

Ruin XXII. This ruin, about 400 feet east of Ruin XX, embraced a group of rooms whose relation to each other was not fully determined. The unit measured approximately 110 by 110 feet (fig. 19).

Ruin XXIII. This ruin, nearly $\frac{1}{2}$ mile northeast of the heart of the village, was near the eastern limits of Los Muertos. The unit

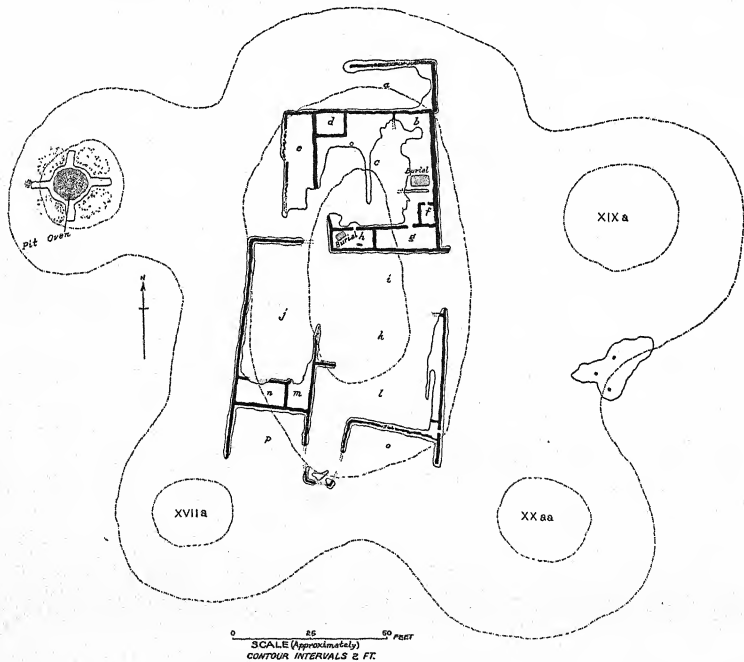


FIG. 16. Los Muertos. Plan of Ruin XIX.

but possibly of the wattle or *jacal* type referable to the Hohokam. Room *s*, in the main structure, may be of a similar type.

Ruin XXI. This unit, 150 feet south of Ruin XX, measures approximately 70 by 70 feet (fig. 18). Room *f* was a complete structure in itself, failing to use any of the enclosing walls.

measured approximately 100 by 120 feet (fig. 20).

Ruin XXIV. One hundred yards east of Ruin XXIII was unit XXIV, a small unimpressive structure of not more than six rooms and several courts (fig. 21).

Ruin XXV. The eastern boundary of Los Muertos was marked by Ruin XXV (fig. 22),

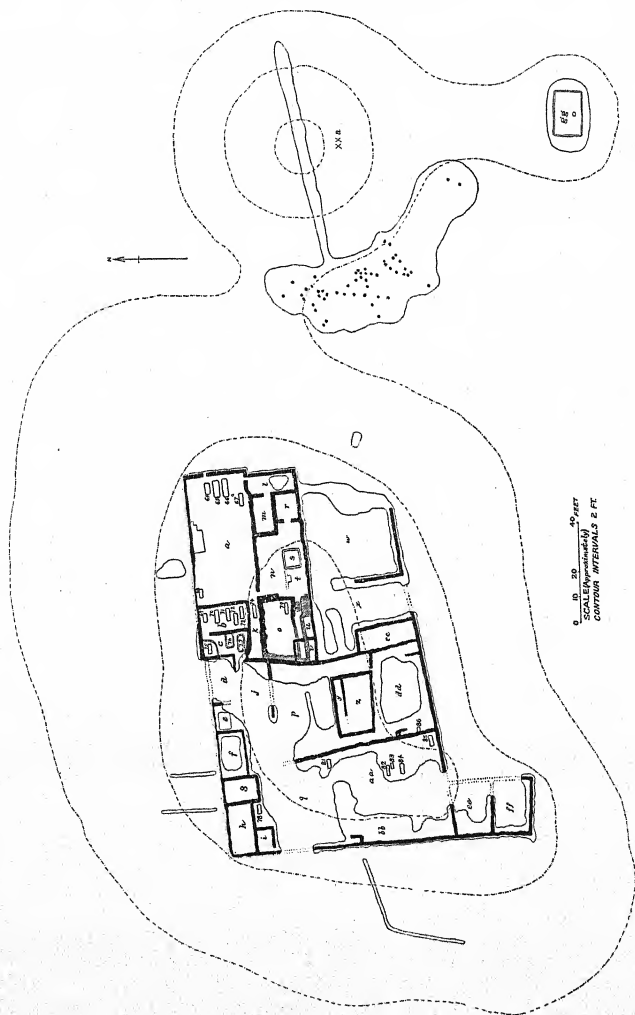


FIG. 17. Los Muertos, Plan of Ruin XX.

over $\frac{1}{2}$ mile east and slightly north of Ruin I. It was the only unit of the group lying on the east side of the main irrigating canal which skirted the village on the east. The map indicates a widening of the canal opposite the site. The dimensions of the house block were approximately 120 feet north and south by 130 feet east and west. The eastern half of the compound was given over completely to a plaza, while the rooms were concentrated along

the Salt River Valley into four classes: (a) priest temples, (b) sun temples, (c) communal dwellings, and (d) ultra-mural houses. Concerning each group he had certain ideas, many of them fanciful, which were used in supporting the idea that the structures were the remnants of a socially stratified society. Fewkes, apparently influenced by this belief, remarked that "An American feudal system developed in the Gila-Salado Basin, marked by the erec-

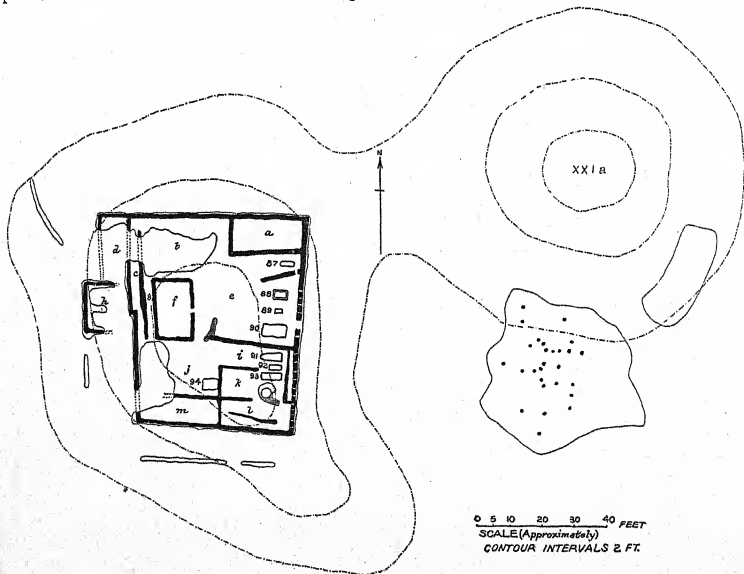


FIG. 18. Los Muertos. Plan of Ruin XXI.

the western enclosing wall. A small cluster of six rooms, at the southwest corner, broke the regularity of outline. The shaded walls in this part of the ruin suggest an earlier structure. Room *cc* to the south, although incompletely excavated, may have been a part of this. Room *l* is reported to have had an elevated fireplace.

DISCUSSION

Cushing divided the architectural remains of

tion of buildings belonging to some chief (civan) around which were clustered small huts, in which the common people lived."²¹ While the possibility of such a condition is not to be denied, it can be satisfactorily shown that the chief architectural difference is ethnic rather than one due to any direct internal social difference within a single group. The gen-

²¹ Fewkes, 1912, p. 152.

eral problem can be clarified somewhat by the following discussion.

The most conspicuous mound of each aggregation of house mounds, Cushing called the priest temple. In Los Muertos, this was Ruin I, a massive adobe structure set within a rectangular enclosing wall. At Casa Grande, Compound A, with its "great house," was cited as

effort; but it cannot be shown that these individuals occupied the great houses, or that they were specifically built for them.

Recently some interesting information has been gathered which sheds further light on the large mounds of the Gila-Salt area. They were not all, as has been supposed, structures of many stories like Casa Grande; neither did they

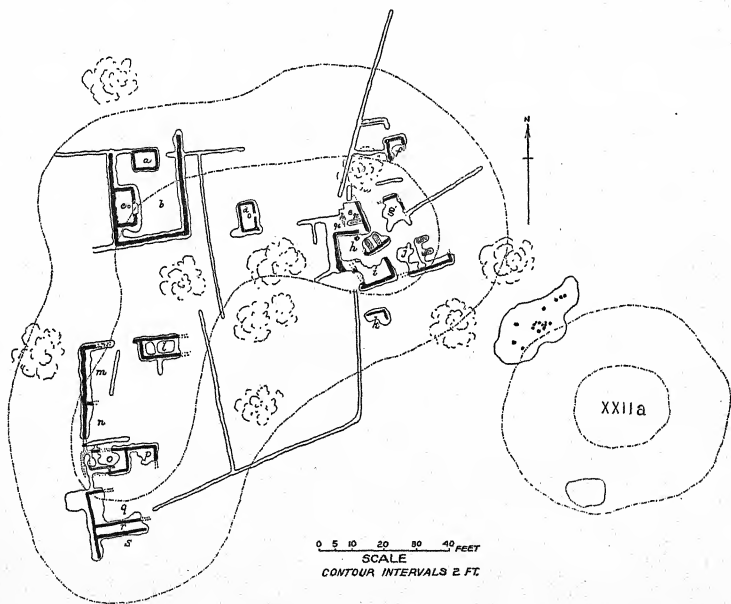


FIG. 19. Los Muertos. Plan of Ruin XXII.

the priest temple. Other ruins in the area evidence similar structures. The gross size of these adobe houses and their central position led Cushing to the assumption that they were the abodes of the priests and that the commoners occupied the less conspicuous neighboring buildings. That overlords or chieftains of a sort were to be found among the people is fairly certain, as the canal construction—even the houses themselves—needed directed

all date from the Civano Phase, nor were they all authored by the Salado.

Pueblo Grande near Phoenix, perhaps the largest artificial mound of its kind in the Southwest, was found to have been built almost entirely by the Hohokam during the Soho Phase of the Classic Period. It appears that the scheme was to erect retaining walls and to fill the areas between with soil producing, in effect, a walled mound. Flimsy brush homes

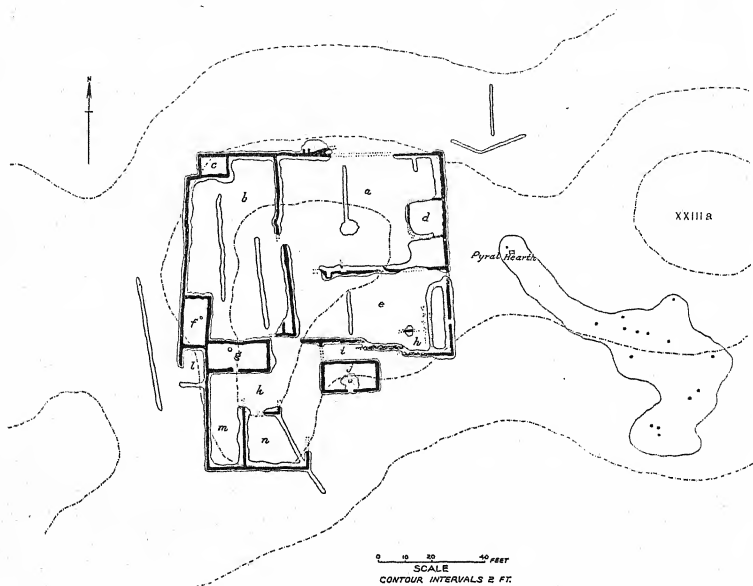


FIG. 20. Los Muertos. Plan of Ruin XXIII.

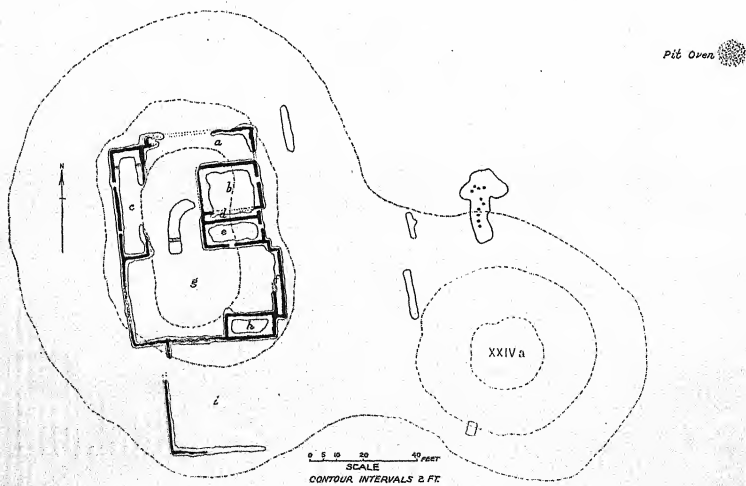


FIG. 21. Los Muertos. Plan of Ruin XXIV.

were then constructed on top of this platform.¹² A similar situation has also been found in Compound B at Casa Grande,¹³ at Tucson,¹⁴ and in the Papagueria,¹⁵ although in the last two areas, structures of this sort appear to date principally from the Civano Phase.

Why the Hohokam should have resorted to this form of artificial mound is not clear. Perhaps it was for defense, or to escape the moisture of water-logged farm lands, or it was an extension of the truncated pyramid idea of Mexico. There are objections to all of these and until southwestern archaeologists settle down to the job of dissecting one of these mounds completely, we can only continue to guess as to their function.

This uncertainty aside, what the evidence amounts to, with direct bearing on the work of Cushing is:

CLASSIC PERIOD

Soho Phase: Walled mounds for habitations of one story, showing a bewildering amount of building and rebuilding in the superimposed floors. Specifically, these appear not to have been recognized by Cushing as distinct from his "priest temples," although the best evidence suggests that the large mound of Ruin I in Los Muertos was, in part, of this type. Construction by Hohokam prior to appearance of Salado people.

Civano Phase: Multiple storied houses of massive adobe walls, erected on top of, adjoined to, or entirely apart from the walled mounds. These were the direct result of the Salado migration, undoubtedly built by the Salado, and the type of architecture appears simultaneously with other traits of their culture. These were Cushing's "priest temples."

Cushing's "sun temples" were of a very dif-

¹² Hayden (in preparation). Obviously, all occupants of a village could not find room on top of these mounds, hence houses always occur in the flats near them.

ferent nature than the foregoing "priest temples." These were oval depressions, usually surrounded by a low bank of earth, located near or among the buildings of the larger villages, although Hodge reports that none were found at Los Muertos. Of those viewed by the expedition in other sites "the smallest measured fifty feet in width by nearly one hundred feet in length. One was discovered whose dimensions were about 150 feet in width by over 200 feet in length."¹⁶ Cushing distinguishes these from the reservoirs, several of which occurred in Los Muertos, as follows: "In . . . appearance they were almost identical with enormous oval reservoirs which occurred throughout this district, with the difference, however, that while the latter were usually lower, and open at one or both ends, the Sun Temples were almost always unbroken."¹⁷

It is clear that what Cushing was describing as "sun temples" were the so-called ball courts of the Hohokam, first examined in detail by Gila Pueblo at Snaketown¹⁸ and since found to have a relatively wide distribution from southern Arizona to Wupatki National Monument north of Flagstaff.

It has been shown that, for the most part, ball courts date from the Colonial and Sedenary Periods and some uncertainty has existed as to whether or not they persisted into the Classic Period. The absence of ball courts in Los Muertos, as indicated by Hodge, may be taken as a reasonably good indication that they did not, as in a village of that size they should certainly have been there, if still in use.

Cushing's third class, the "communal houses," was normal for Los Muertos as exemplified by practically any one of the ruin units. Fewkes further divided these into two subgroups: (a) the true compound, those house clusters sur-

¹³ Fewkes, 1912, p. 98.

¹⁴ Hayden (in preparation).

¹⁵ Scantling, 1940. In the case of the mound in the Jackrabbit ruin near Sells, it could not be proven that houses were erected on top of the platform because of active pot-hunting. Nevertheless, the walled mound idea was well developed.

¹⁶ Matthews, Wortman, and Billings, 1893, p. 146.

¹⁷ Cushing, 1890, p. 166.

¹⁸ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 36-49. See also Chard, 1940, for a review of the ball court problem.

rounded by an enclosing wall, (b) clan houses or, "compact blocks of rooms each without a surrounding wall."¹⁹ This is certainly not a valid distinction since one cannot be sure that a clan actually occupied the so-called clan house merely because it lacked the enclosing wall, or, because a group of houses was enclosed, that a clan did not occupy them. The various ruin

but as to the other assumption we cannot be so sure. The prototype of the compound is found for the first time in the Gila Basin, in what appears to be the final part of the Sedentary Period.²⁰ It is so radical a departure from the local and earlier house form that its introduction, from some other area, seems a fact. Ruins in the Pueblo territory to the north embodying

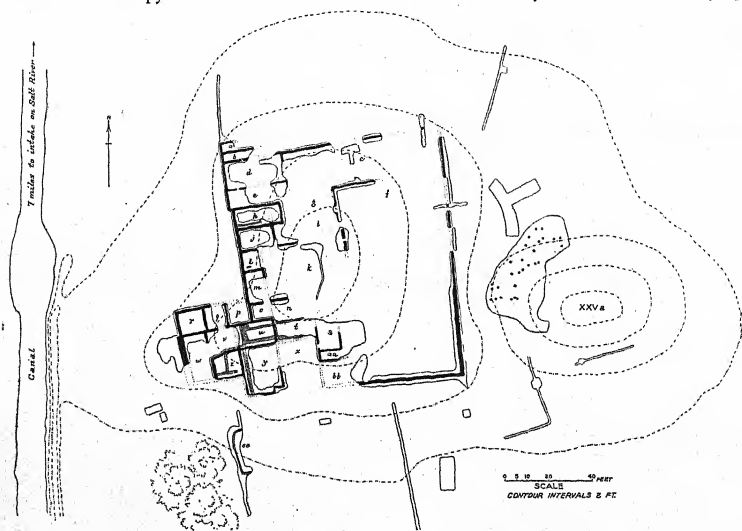


FIG. 22. Los Muertos. Plan of Ruin XXV.

units of Los Muertos show practically all stages from the orthodox compound to a group of houses lacking entirely anything that suggests the enclosure. This may indicate either carelessness or preference on the part of the builders, or it may have been a matter of time, although there is not evidence for the latter.

The compound is generally pointed out as a structure typical of the Gila Basin, supposedly the end product of a long architectural development. That the best and type examples of compounds are to be found here is granted,

the same idea—that of enclosing courts and room clusters with walls—have been found as far north as Flagstaff and as early as Pueblo II.²¹ They have also been noted on the Verde, chiefly along the southern part of the stream,²² along Tonto and Rye Creeks, and in the vicinity of Globe, where the building material was usually stone in place of adobe. The idea was therefore well represented in the Pueblo area at a relatively early time and over a considerable region. The assumption of a Pueblo-Hohokam diffusion, therefore is logical. Once

¹⁹ Fewkes, 1912, p. 87.

²⁰ Gladwin, W. and H. S., 1929a, pp. 31-36.

²¹ Colton, 1932, p. 32, fig. 14.

²² Mindeleff, 1896a, pp. 235-238.

adopted, and apparently with reservations, there was little change until after the arrival of the Salado people when this type of architecture was climaxed.

The ultra-mural houses, Cushing's fourth class, were found to be situated apart or about the edges of compounds. Examples are to be found in Ruins II, VII, and XX. He describes these as "actually the foundations of thin-walled, usually somewhat rounded huts, outside of the walls surrounding communal dwellings, scattered indefinitely and apparently without system (particularly around the outer borders of each city) and designed for occupancy . . . in winter . . . as signified by the occurrence in each, of a central hearth or fire-bowl, like those of the regular houses within the city."²³ Cushing states that interments

were not found in these houses and that cremations were found around the mounds scattered among them. He continues that the "art-remains of the ultra-mural houses and mounds were invariably (though often of a fine order) those of an industrial class of people, while within the communal dwelling and the Temples more luxurious articles" were found.²⁴

While we know only the barest facts concerning the isolated houses, those mentioned are sufficient to point out that distinctions existed in architecture as well as in associated artifacts. The remains are clearly those of the Hohokam on the one hand and of the Pueblos on the other. Some of these may well have been earlier than the compounds but the relationship of others to the compounds themselves is suggestive of simultaneous occupation.

REFUSE HEAPS

Kitchen sweepings, ash, broken vessels, all refuse in fact, were usually carried to a point east of the house unit. The resultant trash piles were reported as "from sixty feet to one hundred and fifty feet in diameter, and reaching a height at the rounded apex of from three to nine feet."²⁵ A few exceptions to the eastern placement of the trash mounds is clear from the maps. The selection of the east side for mounds is generally attributed to the fact that the prevailing wind was from the southwest which would therefore keep ashes and dust out of the dwelling units. But the nearness of one house group to another with numerous rubbish heaps sprinkled in between would certainly not improve the situation. In some

instances two mounds go with a single unit and in the case of Ruins XX and XXII the occupants shared the same trash pile.

Aside from the possibilities of yielding stratigraphic evidence, an important detail which the Expedition failed to inquire into, the trash mounds are significant because at their edges or partly underneath them were found most of the crematory urns of the collection. This apparent relationship of urn plot to trash pile and the idea that the mounds were largely composed of ashes and broken sacrifices of many generations of crematory fires, influenced Cushing in calling them "pyral mounds." This was obviously not the case, as can be verified in numerous extant rubbish mounds.

PIT OVENS

Cushing distinguished, by name at least, between the deep earth ovens and the "pyral hearths" or crematories. Ovens are indicated on the plans of Ruins III, XIV, and XIX, but we have no complete information concerning their dimensions. Copies of rough field sketches, lacking scale, are reproduced in figure 23. According to these, two forms of ovens were found: one with a constricted opening,

the pit being jar-shaped; and the other, a conical type with deepened hole in the center. Judging from other examples which have been uncovered in the area in recent years, one assumes that these pits were from 3 to 7 feet in diameter and from 2 to 5 feet in depth. The late Col. McClintock, a frequent visitor at Los Muertos at the time of the excavations, notes that one of the ovens was about 15 feet in diam-

²³ Cushing, 1890, p. 175.

²⁴ Cushing, 1890, p. 176.

²⁵ Cushing, 1890, p. 173.

eter and 7 feet in depth.²⁶ These huge fire pits were lined with a layer of clay several inches thick (this is probably shown in fig. 23b) which became heavily burned and deeply impregnated with carbon, probably the burnt juices of whatever substances were cooked in them. They usually contain some ashy soil and a large quantity of rocks which bear evidence of having been subjected to intense heat. In some cases a slag was formed in which bits of charcoal and pieces of stone not so readily

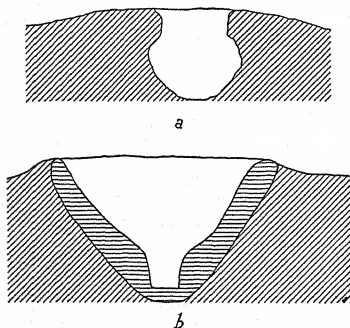


FIG. 23. Los Muertos. Cross sections of pit ovens. Diameters: probably 3 to 5 feet. Courtesy of Brooklyn Museum.

fused were still imbedded. The presence of this probably led Cushing to believe that the pits were used for smelting metals,²⁷ an interpretation which is obviously incorrect.

Living Indians who employ the pit oven use it in connection with the preparation of food. Over stones, heated either in the pit or at its side and then thrown in, is placed a layer of green leaves or of other suitable vegetal substance. On this the material to be cooked is then laid and it too is covered with a layer of leaves or boughs upon which are heaped more heated rocks and finally earth. Sometimes

water is poured into the pit to create steam. The cooking is then permitted to continue for from 12 hours to several days—depending upon the substance being prepared—before the pit is opened. In the Southwest, mescal was the chief item treated in these in recent times. The one universal feature in the pit oven wherever found is the use of rocks.

In viewing the use of pit ovens the world over, their presence in the Gila Basin does not occasion any surprise. They were known to the Pygmies, Bushmen, and some of the Bantu of central and south Africa,²⁸ and used in Sardinia in the Mediterranean, farther east by the Kurds and the Arabs, over the whole of the Australian continent, and widely in Oceania. In the New World, the pit oven was used by the Indians of British Columbia in the Pacific northwest,²⁹ by the northern Shoshone,³⁰ by certain California Indians, as the Panamint³¹ and the Cahuilla,³² and by southwestern and north Mexican groups, both past and present. They occur sporadically in South America. In this far-flung area, the character of the oven naturally varies, as do the materials prepared in them, but the concept of their use is the same.

As the northern Mexican and Southwestern areas are of chief interest here, a little more may be said about them. In Beals' ethnographical studies of northern Mexico, it is reported that the pit oven in northern Mexico and southern Arizona and New Mexico is correlated with the use of agave.³³ North Sierra, Tamaulipas, and southeastern United States are the only culture provinces in which the pit oven is not found.³⁴ It has been adopted by both agricultural and non-agricultural folk.

In the Southwestern area archaeologically, pit ovens were evidently used from very early times on, possibly stemming from a food-gathering economy of the Cochise Culture.³⁵ Later on, however, they appear to be diagnostic chiefly of the Hohokam and the Mogollon Cultures. The earliest evidences of the pit

²⁶ McClintock, 1916, p. 11.

²⁷ Cushing, 1894, pp. 94-95.

²⁸ For this and subsequent references see Friederici, 1914, pp. 5-8, and his full bibliography; also Haberlandt, 1913, pp. 4-7.

²⁹ Bancroft, 1875, pp. 187, 213.

³⁰ Lowie, 1909, p. 188.

³¹ Coville, 1892, p. 354.

³² Kroeber, 1925, p. 695.

³³ Beals, 1932, pp. 164-165.

³⁴ Beals, 1932, p. 140.

³⁵ Sayles and Antevs, 1941.

oven in the Hohokam is from Colonial Period sites³⁶ and they appear to date from approximately the same time in villages of the Mogolol Culture.³⁷ They are very common in sites showing a blending of these two cultures in southeastern Arizona.³⁸

In an 11th-century site on the Zuni Indian reservation in New Mexico, Roberts uncovered an oven with a lateral inclined flue,³⁹ a feature never seen in the ovens farther south.

Modern survivals of pit oven cooking are to be found on every hand. The Hopi and Zuni employ it, as do the semi-nomadic Navaho and Apache, the Paiute, and Yavapai.⁴⁰ Farther south the Pima⁴¹ also use the pit oven.

Since there are modern examples which in details are close copies of those used prehistorically in the Gila and Salt there can be no question of the use to which the ovens of Los Muertos were put. It is even reported that charred corn and mescal remains were found in the pits.⁴² But because the Hohokam practiced cremation, it has sometimes been felt that the large heavily burnt rock-filled pits were used for that purpose. Evidence is accumulating

that a pit was used in cremating but it is somewhat different from the earth oven and is therefore not to be confused with it. In the ovens, the absence of pieces of burnt bone, however small, which eluded the gatherer of the ashes after the fire, and the abundant presence of burnt rocks which would be a hindrance rather than a help where flesh and bone are to be consumed, argue against their use in burning the dead. The cremation pits, on the other hand, are shallow excavations, seldom if ever exceeding 2 feet in depth, but sometimes reaching a width of 4 feet,⁴³ and do not contain the burnt rock. In cremating, a grating of wood was laid over the pits, the body laid thereon, and the fuel was then ignited. Ashes and all fell into the pit from which they could be later gathered for enshrining in an urn. This custom of using shallow pits has its modern equivalent among the Mohave⁴⁴ and the Diegueño,⁴⁵ and a similar treatment seems to have been followed by the Hopewell Culture of Ohio.⁴⁶ A distinction can and should therefore be drawn between the pits used in the preparation of food and those used in the process of cremation.

CANALS

As already pointed out, the location of Los Muertos at a considerable distance from Salt River was made possible by the development of hand-dug canals which directed the water to the residential district and to the fields in the vicinity. Because of their magnitude, they have long attracted much attention. The writings of Patrick,⁴⁷ Hodge,⁴⁸ Fewkes,⁴⁹ Cummings,⁵⁰ Turney,⁵¹ and the more recent survey by Judd,⁵² make further mention of the sys-

tems at large and of the general character of the ditches unnecessary. But of that group of canals with which the Hemenway Expedition came into immediate contact, something may be said.

The map of the canal system (fig. 24) is based largely on the observations of James C. Goodwin and Herbert R. Patrick and supplemented by surveys of Hodge and Garlick in 1887-1888. This map shows a rather elaborate

³⁶ Woodward, 1931, p. 15; Haury, 1932, pp. 57-66; Schroeder, 1940, p. 76.

³⁷ Haury, 1940, pp. 56-62.

³⁸ Trischka, 1933, pp. 417-433; Fulton and Tuthill, 1940, pp. 20-25.

³⁹ Roberts, 1932, pp. 44-45.

⁴⁰ Spier, 1928, p. 119.

⁴¹ Russell, 1908, p. 70.

⁴² McClintock, 1887.

⁴³ Such pits have been uncovered in the Gila Valley by Woodward who informs me that he has found fragments of burnt human bones in them, as well as

fragments of the offerings that passed through the crematory fire; also Gladwin, Haury, Sayles, and Gladwin, 1937, p. 95.

⁴⁴ Kroeber, 1925, p. 750.

⁴⁵ Kroeber, 1925, p. 716.

⁴⁶ Shetrone, 1930, fig. 47, p. 97.

⁴⁷ Patrick, 1903.

⁴⁸ Hodge, 1893, pp. 323-330.

⁴⁹ Fewkes, 1912, pp. 114-115.

⁵⁰ Cummings, 1927, pp. 9-10.

⁵¹ Turney, 1929.

⁵² Judd, 1930b, 1931, pp. 157-166; Halseth, 1932.

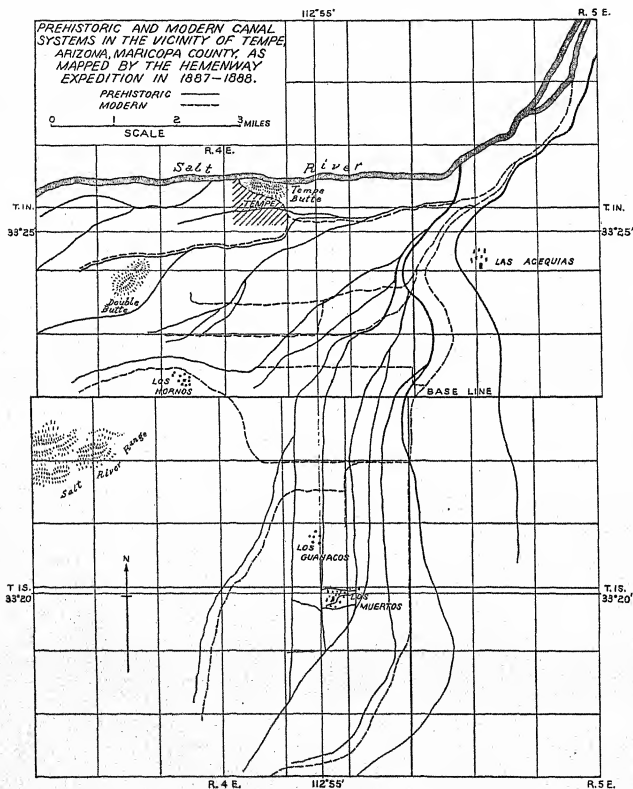


FIG. 24. Hemenway Expedition map of the aboriginal irrigating canals reaching from Salt River south to Los Muertos and beyond.

network of waterways branching from a single master canal whose intake was about 3 miles east of Tempe. From this point the general trend of the ditches was south and west. At a distance of 8 miles from the river, six branches are shown and three of these continue to a distance of 10 miles from the source. The aggregate distance traversed by this "Los Muertos system"⁵³ was over 75 miles. The four ditches in the immediate vicinity of Los Muertos

doubted that the Hemenway map is thoroughly reliable.

Los Muertos was flanked on either side by several main ditches and at least one passed directly through the settlement. After a section of this was cleared of all washed-in material, it was found to be 30 feet in width and 7 feet in depth.⁵⁴ These dimensions, found at a distance of over 6 miles from the intake, illustrate the great size attained by the canals. In

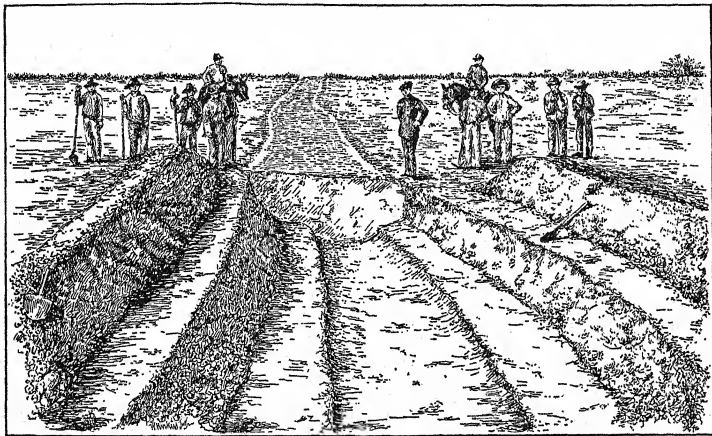


FIG. 25. A sketch showing a small secondary ditch within the major canal as revealed by excavations in Los Muertos. Courtesy of Brooklyn Museum.

ultimately joined to form one branch and they were further united by several cross-canals.

Patrick's map which appeared in 1903 and was compiled from data gathered over the twenty-five previous years does not show the extensive system about Los Muertos; Turney's plan, on the other hand, which was published in 1924 was taken largely from the Hemenway map and is almost an exact duplicate of it. Turney shows a settling basin near the intake of the master canal which the Hemenway plan does not include. Since most of the canals have now been entirely obliterated, the accuracy of the maps cannot be tested; but it is not to be

the bottom of this canal there was found a small secondary ditch. This feature has also been found in the canals on the Gila by Cummings, and is generally interpreted as a measure for conserving water when the flow in the river was low. An early pen sketch of the excavated canal at Los Muertos showing this feature will be seen in figure 25. Matted reeds, found during the course of this work, which had undoubtedly floated in from the river, convinced Cushing that navigation by *balsas* was known to the natives. Needless to say, there is no justification for this view.

By referring to figure 2, it will be seen that

⁵³ Turney, 1924, pp. 6-7.

⁵⁴ Hodge, 1893, p. 325.

three small lateral ditches extended westward from the main canal to the very core of the Los Muertos settlement. Two of these emerge at a widening of the canal south of Ruin XXV and the third leaves the main artery 1000 feet farther to the south. These were obviously designed solely to carry water for domestic purposes to within easy reach of all house units. The two southern ditches joined in the main settlement and were divided here and there for this purpose. How large these ditches were is not reported.

Near Ruins XII and XIV, branches of the ditches ended in depressions, serving as storage basins for the water. Hodge describes the one near Ruin XIV as having been 100 feet in width

and 200 feet in length and a trench cut through the short dimension showed that the original depth was 15 feet.⁵⁵ While the community could have been deprived of water by a hostile party diverting the water at the intake, these basins would have held a considerable reserve supply.

A question of interest in connection with the whole irrigation problem of the Gila-Salt region concerns the origin of the canal systems: whether the Hohokam knew this art before the Saladoans arrived, or whether the latter introduced irrigation. This has been effectively answered by the evidence at Snaketown indicating that the Hohokam had well-established canals as early as the Colonial Period.⁵⁶

THE AGE OF LOS MUERTOS

Concerning the age of Los Muertos, Cushing says, "... the date of abandonment . . . could not have been less remote than from fifteen hundred or two thousand years, and it might have been very much more remote."⁵⁷ Methods for determining the ages of Southwestern ruins have been so much improved within the past decades that Cushing's estimate may be entirely revised. The present figures are the direct antithesis of his, since they are as recent as his were early.

Objects of Spanish or historic origin were not found in Los Muertos. Although the Southwest did not receive its first great influx of Europeans until after 1700, we can be reasonably sure that the occupation of the site predates the earliest landings of the Spaniards on the coast of the New World, on grounds which will presently be shown. Dating by tree rings can be ruled out because the types of wood usable in this technique were probably not found in the remains of Los Muertos, since the altitude is much too low there for coniferous growth.⁵⁸ Consequently, it is necessary to rely upon other means for a date determination, and pottery becomes the most useful material. Gila and Tonto Polychromes, the pottery of the immigrant Pueblo group in Los Muertos,

has been dated in several sites outside of the Gila Basin where tree-ring material has been available. At Gila Pueblo these types were found in a room which produced a log dating from 1385. The same types were found intrusive in several cliff ruins of the Sierra Ancha whose occupation can be placed in the final years of the 1200's, and extending into the first two decades of the 1300's. The period of Canyon Creek ruin⁵⁹ lasted roughly from 1326 to 1348 and several intrusive vessels of the wares mentioned were found there. Further, Gila and Tonto Polychromes were found in the Four-mile and Showlow ruins whose last period dated in the final half of the 1300's. The bulk of the evidence, therefore, indicates that these types are strictly of the fourteenth century and, since they are the same as those found in Los Muertos, the occupation there is indirectly placed in that period.

A still further check is obtained from intrusive sherds in Los Muertos. Four-mile Polychrome pottery, centering in the upper Salt and in the southern part of the Little Colorado drainage, has been allocated to the 1300's by dates from numerous ruins. Jeddito Black-on-yellow, a proto-historic Hopi ware, has likewise been stamped as a product of the 1300's.

⁵⁵ Nevertheless, some of the structural beams of Casa Grande were of pine, obtained from many miles away, and the same may have been the case in Los Muertos.

⁵⁶ Haury, 1934a.

⁵⁷ Hodge, 1893, p. 329.

⁵⁸ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 57.

⁵⁹ Cushing, 1890, p. 186.

Sherds of both types were found as intrusive factors in Los Muertos, having arrived there certainly in the period when the village was occupied.

How long into the 1300's or even into the 1400's this occupation persisted is a matter of conjecture. A fair guess, however, would place the permanent abandonment of Los Muertos, Casa Grande, and allied ruins as around 1400; certainly not later than 1450.

When Los Muertos was founded is quite another matter. A meager handful of Colonial and Sedentary Period sherds indicates occupation during those horizons on a small scale, but

it appears from the Expedition's evidence that the real burst of building came entirely in the Classic Period.

Fewkes held to the belief that the ruins of the Salt were older than those of the Gila and of the Santa Cruz.⁶⁰ The superior preservation of the Casa Grande is suggestive of this, but in the pottery, which is a more reliable criterion, a difference cannot be detected. In all three areas, occupation goes back into the Pioneer Period and the greatest structures were built in the Classic Period; but there is little to show that the ruins of one area were older than those of the others.

DISPOSAL OF THE DEAD

The Expedition found that both inhumation and cremation were extensively practised in the disposal of the dead at Los Muertos. Earth burials were encountered under the floors of the rooms or in the courts which were surrounded by walls. Not a single case is recorded of finding a burial in the trash mound outside of the ruin unit — the favorite place in the more northerly Pueblos. Urns with calcined bones were invariably placed at the edge of or near the refuse piles and never within the walls of the house clusters. This clear-cut distinction in burial method led Cushing to believe that a caste system was in operation among the inhabitants of Los Muertos, the house burials being those of the priestly class, the cremations those of the poorer outcast class.⁶¹ In the light of our present knowledge of the facts this view is no longer sustained. The inhumations can with certainty be claimed to have been made by the people ethnically Puebloan. This is shown by the characteristics of the crania, by the associated Pueblo types of pottery — Gila and Tonto Polychromes — and by the fact that house burial was customary among the people of the same stock farther to the east where the same forms of pottery also occurred. Their ruins lie chiefly to the east; Gila Pueblo and Togetzogi⁶² may be mentioned as examples. Only in one or two cases were red-on-buff vessels found with inhumations.

Both sexes and individuals of all ages were represented in the burials.

Cremation, on the other hand, was the inheritance of the Hohokam. When decorated vessels were found containing incinerated bones, or as offerings beside them, they were with few exceptions of the red-on-buff type. The exceptions proved to be polychrome. This, with the reverse conditions noted above, testifies to a limited degree of mutual borrowing of the two groups, whether this exchange was restricted to pottery or whether the burial method was involved we have no way of knowing.

As an urn plot was associated with each house unit, it is reasonable to say that the Hohokam lived in or near enough to each communal group to be identified with it. The ratio of cremations to burials is about 3:1 which is pretty good evidence that the Hohokam were in the majority, provided that the cremation plots were used only during the period of co-occupation which seems likely. Since Salt Red and Salt Smudged are primarily Civano Phase types and these were the common utensils with cremations, it may be safely inferred that both burial practices were simultaneously followed. An examination of the burnt bones, which were brought in with the collection, clearly shows that the members of both sexes, young and old, were accorded cremation rites.

⁶⁰ Fewkes, 1909, p. 420.

⁶¹ Cushing, 1890, pp. 173-174.

⁶² Schmidt, 1926.

As this same condition was noted among the burials, and taking into consideration the background of the two peoples, the case for burial for the priestly and cremation for the lowly falls to the ground. The difference is surely an ethnic one.

INHUMATIONS

As the details of the burials are summed up by both Cushing⁶³ and Matthews,⁶⁴ these need not be repeated at length here. The bodies were customarily laid to rest on the back, fully extended, with the head to the east. The mortuary offerings were placed about the body. Infants were buried near the hearths. Both double (pl. 3b) and treble burials occurred, but in the majority of cases the interments were not believed to have been simultaneous. A few of the more special burials may be mentioned.

In Ruins I and XX several clay "sarcophagi" were found. These are reported as having been carefully walled up and plastered over so that the rooms in which they were could still be occupied. There is some verification for this by Fewkes' discovery at Casa Grande of a burial of this sort⁶⁵ but in general the custom was rare. It may be, as has been suggested by both Fewkes and Cushing, that these were graves of individuals of rank. A photograph of one of the "sarcophagi" in Ruin I (pl. 3d) leaves one somewhat in doubt as to the true identity of these curious constructions. The body seems to rest only slightly more than a foot below the rim, which is very smooth and impresses one as having been a floor. The adobe case has evidently been left standing in removing the soil down to a second and lower floor. There is, at least, very little to suggest that the whole construction was specifically made for the body. As more recent excavations in ruins similar to Los Muertos have shown that there is often a complicated overlapping of floor levels, it would seem here that the burial was made through and to a point

below the upper floor but above the lower one and that the "sarcophagus" was a fluke of excavation rather than a reality.

Plate 3c shows the grave of a young woman uncovered in Ruin XX. This was apparently the only case where the limbs were splayed.

The crania collected during this work show marked brachycephaly.⁶⁶ Occipital deformation was almost a universal feature, but, judging from the drawings of more than fifty crania published by Matthews, Wortman, and Billings,⁶⁷ it would appear that this phenomenon was not so marked here as it was farther to the north and east. This is in keeping with more recent skeletal finds higher in the Salt drainage which show, on the whole, a decrease in amount and in the frequency of posterior flattening over the skeletal remains of the north-erly cultural centers.

Mortuary offerings consisted mainly of pottery, but much of the material described in the following pages, such as jewelry and some of the smaller stone artifacts, were also found with the dead.

CREMATIONS

From the very beginning of the Hohokam development as now known, cremation was universally practised. During the Pioneer and Colonial Periods, the calcined bones of the dead were buried either in trenches or pits without being gathered into urns.⁶⁸ As far as the records show, pit cremations were not encountered by the Expedition, although they should have been present at Los Guanacos. To find the burial plots is not always an easy task. During the Sedentary Period, urn cremations first appeared and this form persisted into the Classic Period. The Expedition's urn recoveries practically all belong to the latter horizon.

In Los Muertos, where between three hundred and four hundred cremations were found, the urn plot was always sought near the trash mound. One of these burial areas, laid bare, is shown in plate 4a. In the maps of the ruin

⁶³ Cushing, 1890, pp. 169-172.

⁶⁴ Matthews, Wortman, and Billings, 1893, pp. 148-150.

⁶⁵ Fewkes, 1912, pp. 108-110; see also Fewkes, 1927, p. 215.

⁶⁶ For further metrical and morphological observa-

tions of the Hemenway skeletal material, the reader is referred to: Matthews, Wortman, and Billings, 1893, pp. 141-286; Matthews, 1889; Hrdlička, 1931.

⁶⁷ Matthews, Wortman, and Billings, 1893.

⁶⁸ Woodward, 1931, pp. 11-12; Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 93-95.

units the location of the plots was most frequently on the north side of the refuse heaps, but they were also found in several cases on the northwest, west, and south sides. As a general rule, the trash mounds seem to have grown in an easterly direction which undoubtedly accounts for the absence of cremation areas on that side.

As to the method of cremation, we can only surmise. The entire procedure probably differed little from the method employed by modern lower Colorado and southern California tribes.⁶⁹ From such objects as beads, shell jewelry, arrow points, which show the effects of the great heat of the fire, one can be sure that the individual was burned with all personal jewelry and other possessions. Even the auxiliary vessels, which were later to be placed with the urn, passed through the fire. The urn designed to hold the bones, however, seems not to have been subjected to the fire.

After the fire had burned itself out and the embers cooled, the remaining bones were gathered normally into a jar for burial. This was covered either with an inverted bowl or with a large potsherd. Cushing reports that these were sometimes shaped to the mouth of the jar and plastered in with clay.⁷⁰ The jar was then buried from 1 to 3 feet in depth together with the accessory vessels. The ritual "killing" of a vessel, which Cushing mentions as having been resorted to, was by no means a common occurrence. There is, indeed, but one jar in the entire collection with a small pierced hole near the bottom suggestive of this practice.

In addition to the burnt bone fragments, the jars usually contained some soil, occasionally small bits of charcoal, and in about fifteen per cent of the one hundred and thirty-four lots of cremation bones at hand, the remnants of jewelry and other offerings were included. The amount of the bones themselves varied greatly. Some urns had only a few very small fragments representing mature individuals, while others were practically full of ashes. This was obviously dependent upon the thoroughness of the burning and the care exercised after the fire had died down in collecting the bones from the crematory. The average amount of ash and the usual size of the bone

fragments will be seen in plate 4b. Of infant bones there was usually very little residue.

There were three instances of double cremation, i.e., where the bones of two individuals were mingled in the same urn. This undoubtedly indicates that both persons were burnt on the same funeral pyre. In two cases the bones of children were associated with those of adults, while in the third case the ashes of two adults were represented.

ANALYSIS OF BONES: Since the contents of many of the funerary jars were saved by the Expedition, it has been possible to thoroughly comb the ashy remains for any evidence of age, sex, and morphological characteristics of the individuals represented. Where data concerning physical type are so sadly lacking, it was felt that even the meager evidence derived from this source might prove helpful. One is prevented, however, from making any statistical analyses because a given set of observations cannot be consistently made on the bones of every cremation. It follows, therefore, that most of the items set forth below are the result of impressions gained from handling the material, while at the same time a few more concrete facts have grown out of it.

First, concerning the working material, it may be of some interest to know what parts of the human body withstood the fire best. In each cremation lot, the largest pieces and those which had either sex or age values were sorted out. The smaller pieces, mostly useless, consisted largely of chips from the badly macerated large bones, of rib fragments, bits of cancellous tissue, and in general the more fragile bones of the body. In nearly every case skull fragments were present, but never a complete single bone of the cranial vault survived. The most persistently occurring bone of the skull is that portion of the occiput thickened by the internal crest and the external torus. This part was present in fifty-eight cases out of the one hundred and thirty-four lots of bones examined. The inferior part of the occipital bone bearing the foramen magnum was never preserved. Of the frontal bone, the medial part which is re-enforced internally with a crest occurred most frequently. In two cases

⁶⁹ Forde, 1931, pp. 207-213; Kroeber, 1925, p. 750; Davis, 1921; James, 1928, p. 225.

⁷⁰ Cushing, 1890, p. 172.

the supraorbital ridges were preserved. The petrous processes outlasted all other parts of the temporal bone, occurring in eighteen cases. Of the facial skeleton little remained, maxillae being the most common. Condyles of the mandible survived all other parts of that bone, although the heavy body of the jaw was preserved in part in nearly as many instances. It was a very noticeable fact that breaks in the mandibles usually came somewhere between the canines and the first molars on both branches. Roots of teeth being shielded within the bony structure of the jaw were usually the only traces of the dentition. Crowns were universally reduced to dust. Scapulae and vertebrae were sparsely represented and then, naturally, only in the fragmentary state. Of the pelvis, a portion bearing the sacro-sciatic notch, a useful sex diagnostic, appeared regularly when pelvis parts survived. Long bones were either broken by the heat, or wilfully, into small fragments never exceeding 4 or 5 inches in length. Shaft fragments are most numerous, as one would expect. The cancellous bone forming the articular ends is largely broken up and measurements on femoral heads were never possible. Among the surviving foot bones the astragalus appeared most commonly.

Age: In determining the ages of the individuals at the time of death, the standard criteria were employed, such as: the degree of sutural occlusion which could be obtained in large measure from the numerous skull fragments, union of the epiphyses, tooth eruption, and lipping of the scapular glenoid fossa. Of one hundred and thirty-seven individuals represented in the collection of one hundred and thirty-four lots of bones (this includes three certain double cremations), one hundred and twenty-four were assigned to age groups, as follows:⁷¹

Children	3
Adolescent	4
Sub-adult	4
Young adult	24
Middle-aged adult	15
Old adult	17
Adults not accurately placed	60

124

It was noticeable that the older the individual, the more resistant were the bones to the fire. The bones of children and adolescents, being relatively thin, cracked and warped more than the bones of maturer individuals. As the bones of youths are still partly cartilaginous, there would be less of the mineral matter to resist the fire. This undoubtedly accounts in a large measure for the deficiency in number of children as listed above. It may also be that in saving the bones, the members of the Expedition selected only those lots with larger amounts and better preserved fragments. Two of the three children were with adults in multiple cremations. The adolescent group likewise is small for the reason stated. The very short age range of the sub-adult, only three years, makes identification extremely difficult. On that account some of the individuals classed as young adults may actually have belonged in the sub-adult category. While it was possible in many instances to recognize the bones to be of matured persons, the criteria were not sufficient to permit a more accurate classification. Hence, a large adult group resulted. These should, in all probability, be added to the deficient middle-aged group, which would then bring the proportion more closely to expectancy. The old age group includes a normal number of persons for the size of the sample.

A color variation in bones is also to be noted. Those of young individuals were invariably very light in color, while the ashes of adults were gray and sometimes very dark gray. This was especially apparent in the double cremations containing children and adults, both being burnt, presumably, in the same fire.

Sex: Sex determinations were more difficult to make because the bones were so finely broken, and because often the decision had to be made on one or two characters which in a normal skeleton could be checked against other diagnostics. On that account the results are not as reliable as they might be. The most useful single parts in making the decisions were the sacro-sciatic notches of the pelvis, mastoid processes, and the hindmost parts of the occipital bones from which the musculature of the nuchal area and the size of the external occipital torus could be judged. The robust-

⁷¹ Hooton, 1930, p. 18, gives the older age groups as follows: sub-adult, 18-20 years; young adult, 21-34

years; middle-aged adult, 35-54 years; old adult, 55 years and over.

ticity of the bones was also relied upon. Of the one hundred and thirty-seven individuals represented, sixty-seven were sexed, thirty-six of these being males and thirty-one being females. They are distributed in the age groups as follows:

Males:	Young adults	7	
	Middle-aged adults ⁷²	19	
	Old adults	10	
			36
Females:	Sub-adult	1	
	Young adults	7	
	Middle-aged adults ⁷²	16	
	Old adults	7	
			31
			Total 67

If the above sample can be regarded as large enough, and the sex determination sufficiently valid for further analysis, then one gains an idea as to the ratio of males to females in the population of the cremating element of Los Muertos, not including youths. This ratio is 116.1 males to every one hundred females. A different situation appears when the deformed skulls listed by Hrdlička⁷³ are examined on the same basis. These, it will be recalled, were taken from house burials and were the interments of the Pueblo element of the population. The collection of crania contains sixty-two female and fifty-seven male skulls. This reduces to a proportion of 108.7 females to every one hundred males. Whether this reversal of conditions is due to vagaries in collecting the samples, or whether it reflects the true state of affairs, I do not know. It is of interest, however, to note that a difference does exist in the skeletal material representing the two ethnic elements. Ratios determined for other Pueblo groups are: Pecos, 140.8;⁷⁴ Mimbres (Swarts Ruin), 133.75.⁷⁵ Further evidence than has been presented on the age and sex of cremated persons is not needed to show that cremation was not class limited as Cushing believed. Individuals of all ages and of both sexes

were treated alike after death. The same can be said for the inhumed dead.

Observations: From the fragments of crania slight evidence was obtained concerning the head form of the burned individuals. The largest skull fragment, including a considerable part of the occipital bone and parts of the parietals attached to the former because of closed sutures, is distinctly that of a round head or brachycephal. By comparing other fragments with this, especially in the point of the degree of the occipital protuberance, and the narrowness of the area of nuchal musculature, it became quite evident that the majority of the individuals must have been of a different head form. That is to say, that the posterior projection of the occiput of skull fragments, where large enough for comparison, was distinctly more than that of the round headed skull fragment, and that the area for the attachment of the nuchal muscle was narrower. While these points are not absolutely reliable, they are suggestive of dolichocephaly.

On the whole, the evidence for deformation seems very slight. There were no good indications of flattened heads among the largest skull fragments on which judgment could be passed. The Hohokam are believed not to have practised deformation, while all the skulls derived from burials were posteriorly flattened.

Under pathological features, Wormian bones were noted in six instances, three being in males and three undetermined. There was one instance of a mal-erupted tooth, a right upper lateral incisor which emerged from the facial surface of the maxillary bone near the corner of the nasal aperture, and three cases of abscesses, two being in female mandibles and the third was not determined as to sex. Evidence of osteoporosis symmetrica,⁷⁶ which seems to have been most active in adolescents, was recognized in seven instances in the porotic condition of the parietal and occipital bones of the cranial vault. As to sex, six of these were males and one was not determined. There was one case of periostitis, as shown on an affected femur.

⁷² With these groups are classed those which could be assigned only to a broad adult class.

⁷³ Hrdlička, 1931, pp. 30-31, 50-51.

⁷⁴ Hooton, 1930, p. 32.

⁷⁵ Howells, 1932, p. 116.

⁷⁶ Hooton, 1930, pp. 316-319.

It must be acknowledged that the Gila-Salt region was a major focus for cremation in times past, while for the whole of the Pueblo area to the north and east, inhumation was the rule. It is of some interest to note the extent to which the practice of cremation penetrated the district where earth burial was the vogue. Flagstaff has probably produced the earliest cremations outside of the Gila. These dated Pueblo II and could be distinctly attributed to an influence from the south.⁷⁷ Both Norden-skiöld⁷⁸ and Fewkes⁷⁹ mention cremations from the Mesa Verde but the bones here were apparently not placed in urns and the occurrence cannot so definitely be linked with the Gila. Although the Zuni know cremation traditionally,⁸⁰ their archaeology does not substantiate the former use of such a custom among them. At Hawikuh, however, cremations were found frequently associated with

Gila Polychrome.⁸¹ It is inferred from this that the Hawikuh cremations were contemporary with Los Muertos on the basis of the ceramic association and that they were of Pueblo folk, probably from the Gila who had taken over cremation practices from the Hohokam. In the Mimbres Swarts ruin, which produced something over one thousand inhumed bodies, there were six cremations,⁸² and they appear occasionally in earlier time levels here as well as in the Upper Gila.⁸³ As Middle Gila (i.e., Hohokam) influences are to be recognized in the material culture of the Mimbres, it may be assumed that the few instances of cremation are likewise traceable to that area. For northern Mexico the data are not complete. At Casas Grandes inhumation seems to have been the rule, but on the western coast urn burials are reported from Aztatlan⁸⁴ and the custom was known well into southern Mexico.⁸⁵

THE PROBLEM OF PHYSICAL TYPE

If physical distinctions can be shown, as well as basic cultural variances, the case for an ethnic difference of the Hohokam and the Salado people of the Salt River and Gila Valley villages would be greatly strengthened. The immediate and almost insurmountable obstacle to overcome in pointing out this diversity is the fact that the Hohokam from the earliest times on cremated their dead. As shown by the examination of the ashes the possibility of retrieving reliable and helpful information from the incinerated bones is extremely slight in proportion to the proof needed. In such a matter as head form, the cremated remains are only suggestive.

Gladwin has recently reviewed this question, pointing out the risks of drawing conclusions on the strength of the few unburned and ap-

parent Hohokam skulls now known.⁸⁶ These skulls, in themselves, present contradictory evidence in that the Tucson specimen, of Colonial Period date, is dolichocephalic, while the two Snaketown skulls, of Sedentary Period age, are brachycephalic.⁸⁷ And since we cannot prove satisfactorily yet that the Pima are the lineal descendants of the Hohokam, an inspection of the racial characteristics of the Pima with the idea of projecting these backward in time, is of little avail. The one hope the archaeologist has to settle this problem is to find a sufficient number of burials on the Papago Indian Reservation which seems to have been occupied by Hohokam, or very close relatives, where cremation was apparently not followed.

Turning to the unburned skeletal remains

recurring visits to the Zuni.

⁷⁷ Hargrave, 1932, pp. 27-28.

⁷⁸ Nordenskiöld, 1893, p. 49.

⁷⁹ Fewkes, 1910, pp. 154-155, 1911, p. 77.

⁸⁰ Cushing, 1896, p. 336.

⁸¹ Hodge, 1924, p. 14. Hodge states that this ware was "brought by members of one of the Piman tribes who visited the Zuni periodically, at least as late as the sixteenth century, exchanging services for turquoise and skins." While the polychrome ware is non-Piman, it is not to be doubted that members of that group joined the Pueblos from the Gila on their

⁸² Cosgrove, 1932, pp. 25-26.

⁸³ Haury, 1936, pp. 24, 64, 92.

⁸⁴ Sauer and Brand, 1932, p. 36.

⁸⁵ Beals, 1932, p. 206. For comparative data on historical cremation practices see Spier, 1928, pp. 293, ff., and James, 1928.

⁸⁶ Gladwin, 1937, pp. 82-86.

⁸⁷ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 246.

recovered at Los Muertos, the following facts may be noted:⁸⁸ Of a collection of one hundred and twenty-two measured skulls there were three undeformed, two male and one female.⁸⁹ The cranial indices for these were, 75.0 and 75.8 (male), and 81.1 (female). Now, it would be of some note to know where and under what circumstances the long undeformed skulls were found, as they might possibly date from a pure Hohokam Period, but the data on these points have been lost. Of the one hundred and nineteen deformed skulls, fifty-seven male and sixty-two female, the cranial indices of only six skulls ranged below 80.0. It is probable, therefore, that the long undeformed crania may represent the Hohokam stock. The average capacity of these two male skulls was 1508 cc as against an average of 1399 cc of twenty-nine deformed male crania from Los Muertos. The former series is undoubtedly too small, however, to be significant; but there is a suggestion, at any rate, of the existence in the ruins excavated of a long undeformed group and a pronounced brachycephalic deformed group.

As for the affinity of the round headed group, the cultural material found in the graves of these individuals, primarily Salado, is in accord with the conclusions reached by ten Kate that the Zúñi and the Hopi are "somatolog-

ically closest related to the ancient City-Builders, whose osseous remains were exhumed in such great numbers by the Hemenway Expedition."⁹⁰ The affiliations are undeniably more closely with the Pueblo groups in general than they are with the Pima now living in the region. Whether or not the Pimas had anything to do with the ruins then being excavated was a question often discussed by the members of the party. On the grounds that the "anthropological data do not confirm the belief that they (the Pima) are the direct descendants of the ancient City-Builders of southern Arizona" ten Kate concludes; apparently that the Pimas can be discounted. Yet, he states that according to Pima tradition "not one but several people built these cities and lived in them."⁹¹

Summarizing, it may be said that the observations of the cremated bones from Los Muertos were somewhat suggestive of long-headedness among the Hohokam and that the few known skulls from Hohokam sites are contradictory with respect to head form thereby leaving this question still open; that the deformed crania from Los Muertos are morphologically like contemporary and modern Pueblo groups and that these may be accepted as representing the Salado Culture or the immigrant element in the valley.

POTTERY

The pottery of Los Muertos represents two ceramic complexes: the red-on-buff of the Hohokam, and the polychrome pottery of the Salado Culture. On the grounds of seniority, the red-on-buff may be rated as indigenous to the area in spite of the fact that its actual beginnings have not been found;⁹² and the Puebloan polychrome was a late prehistoric thrust of relatively short duration into the red-on-buff area from the northeast. The meaning of this situation can be brought out to some extent by the present collection, appraised in

terms of the more recent archaeological work. Added to the above two classes of painted pottery there is also a large amount of polished red ware with smoke-blackened interiors of several types, and a plain ware chiefly of Hohokam origin, which was to this culture what the corrugated ware was to the Anasazi. Because the Classic Period pottery has not been fully reported on and as the Los Muertos Collections of the same are very rich, this study will go into considerable detail on the following pages.

ruin near Zúñi, and inadvertently included under the Salt River Valley heading.

⁸⁸ Abstracted from Hrdlička, 1931; see also Matthews, Wortman, and Billings, 1893.

⁸⁹ In the tables given by Dr. Hrdlička, six undeformed skulls were included from the Salt River Valley. It was later shown that three of these (nos. 239,524, 239,251, 239,457) were from Heshotautha, a

⁹⁰ ten Kate, 1892, p. 138.

⁹¹ ten Kate, 1892, p. 142.

⁹² Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 220, *et seq.*

The provenience of the pottery in Los Muertos, as revealed by the field card catalogue, was mainly from three sources. Richest were the yields of the cremation plots consisting of the cinerary urns with bones and the accompanying offertory vessels; burials interred below the floors of dwellings provided a second source in the grave furnishings; and lastly, the living rooms yielded some pottery, left behind either by force or by choice when the place was abandoned. The distribution of the Los Muertos pottery as to types and sources is summed up in the following table:

TYPES	SOURCE			
	Cremations	Burials	Rooms	Totals
Red-on-buff	14	5	7	26
Polychrome	6	28	18	52
Red ware	351	89	56	496
Plain ware	71	6	4	81
	442	128	85	655

RED-ON-BUFF

Enough excavation has been done in the past few years to permit a periodic division of the red-on-buff pottery development.⁹³ A deficiency of data in certain parts of the chronology is admitted, but through a strong survival value of red-on-buff, it is fixed at one end to the historic period by living types,⁹⁴ while the remote end of the scale can be dated in relative terms only, but possibly as early as the beginning of the Christian era. Our major interest lies in the Classic Period to which the Los Muertos vessels belong.

The Classic Period has been subdivided into two phases: the Soho Phase (early), characterized ceramically by Casa Grande Red-on-buff,⁹⁵ Gila Red,⁹⁶ Gila Smudged,⁹⁷ and Gila Plain;⁹⁸ and the Civano Phase (late) with the following pottery diagnostics: Casa Grande

Red-on-buff, Gila and Tonto Polychromes,⁹⁹ Salt Red,¹⁰⁰ Salt Smudged,¹⁰¹ and Gila Plain. It will be noted that the red-on-buff type remains the same in both phases and that the real differences lie in the addition of the Salado painted types and in minor refinements to the red and smudged forms.

The Classic Period may be dated in time to late prehistory on the premise of associated material from adjacent regions to the north and east. These associated artifacts, chiefly pottery, come from the area where tree-ring dating is in effect. The inclusive time for the period, based on recent stratigraphic work by Schroeder in the Salt River Valley is from 1150 to 1400 A.D., with the phase separation coming at about 1300 or soon after.¹⁰²

The chief source of red-on-buff vessels in Los Muertos was from the cremation plots where fourteen more or less complete pieces were found, each containing incinerated human bones. Seven vessels were found in the domestic rooms and five came to light as burial furniture. With the exception of one example out of the twenty-six, the vessels are of the Casa Grande Red-on-buff type. The one exception dates from an earlier period and may have been found by the occupants of Los Muertos on an older site, Los Guanacos, which was not far distant.

The collection of potsherds from Los Muertos contains a relatively small percentage of fragments that can be recognized at once as dating from either the Colonial or the Sedentary Period. This intrusion of early sherds into a late period is to be expected when an early site existed not far away. A representative series will be seen in plate 5. Sherds *a*, *b*, and *c*, showing either life forms or small repeated elements, are characteristically the Colonial Santa Cruz Red-on-buff; *d* and *e* are fragments of the very typical flare-rimmed bowls which ex-

⁹³ Gladwin, W. and H. S., 1929a, pp. 21-46; Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 168-212.

⁹⁴ Kroeber, 1925, p. 378.

⁹⁵ Gladwin, W. and H. S., 1933, pp. 22-24.

⁹⁶ Colton and Hargrave, 1937, pp. 176-177; Schroeder, 1940, pp. 183-184. On the strength of stratigraphic studies, Schroeder has made certain refinements over the existing descriptions of Gila Red.

⁹⁷ Schroeder, 1940, pp. 184-185.

⁹⁸ Colton and Hargrave, 1937, pp. 174-175.

⁹⁹ Colton and Hargrave, 1937, pp. 88-91. Schroeder notes (p. 117) that Gila Polychrome is present in the Soho Phase. This apparent discrepancy boils down to the methodological problem of where to draw the line between the phases. It has been customary to regard the appearance of the Salado types in quantity as the logical time to end one phase and begin another.

¹⁰⁰ Schroeder, 1940, p. 185.

¹⁰¹ Schroeder, 1940, p. 186.

¹⁰² Schroeder, 1940, p. 117.

tended from the Colonial into the Sedentary Period; *f* and *g* are fragments of thick-walled vessels, also early in the red-on-buff scale; and examples *h* and *i* are from Sedentary Sacaton Red-on-buff jars, the former showing the sharply recurved rim which contrasts with the vertical necks of Classic jars, and the latter is a section of the angular "Gila shoulder," a marked feature of the Sedentary Period.

Casa Grande Red-on-Buff

TECHNOLOGY ¹⁰³

Method of Manufacture: The technological literature of Puebloan wares usually takes it for granted that the pottery was made by the spiral coil-scape method. Red-on-buff pottery, on the other hand, down the line of its development from the earliest known forms to present-day survivals, was made by coiling with paddle-and-anvil. This contrast in technique of manufacture becomes sharp when the two classes of pottery occur together, as in the Gila-Salt area, coupled with the shape and design differences.

It is not necessary to go into much detail concerning these differences in pottery construction. Gifford ¹⁰⁴ has described both and pointed out the existence of the paddle-and-anvil method among the Indians of the Lower Colorado River drainage; Russell ¹⁰⁵ gives a specific account of the method among the Pima, who now live near the very region from which the current specimens were collected. Archaeological descriptions of the red-on-buff complex on this point are found in the reports of Woodward ¹⁰⁶ and the writer.¹⁰⁷ But one fact should be pointed out which is often misunderstood. Both methods, i.e., coil-scape and paddle-and-anvil, add clay to the growing vessel wall by a process of coiling, usually continuous or spiral in the case of the former, and usually discontinuous or concentric, in the case of the latter. It is true also that, as a rule, the thickness or weight of the coil is much greater in paddle-and-anviled pottery than in the coil-scraped type, a difference directly correlated with the

subsequent treatment. A potter would find herself in trouble trying to paddle out the thin walls of a vessel in which the coils are only a little thicker than the vessel wall will eventually be, just as she would find it wasteful to scrape thin the walls of a vessel built up of excessively thick coils. The real difference then lies in the method of finishing, and excluding a few sections of the Southwest, as in the Flagstaff and Gila-Salt area, these methods seem to have been mutually exclusive in archaeological times. Today, the centers of the spiral coil-scape and the unit-coil paddle-and-anvil techniques are still where they were a thousand years ago.

The recognition of these methods from sherds is not always easy. What is the tangible evidence? Paddle-and-anvil finished pottery shows, on the interiors of jars, shallow basin-like depressions which are the anvil marks. Contrary to the Pueblo custom of scraping the interiors of vessels, the Hohokam left them unmodified, thus these anvil marks remained unchanged. But where scraping followed, it is impossible to tell. The result was that the thickness of the vessel wall varied greatly within an area a few inches square, depending upon the size and curvature of the head of the anvil. This fact is clearly demonstrated by the cross section (fig. 26, *a*) of a normal sherd of a Casa Grande Red-on-buff jar. The thinnest

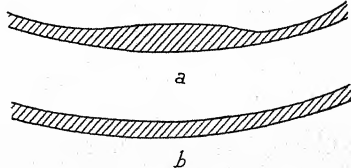


Fig. 26. Cross sections of paddle-and-anvil made pottery (*a*) and coiled pottery (*b*). Length of section shown, about 4 inches.

portions (as little as $\frac{1}{8}$ of an inch) represent the points where the anvil received the impact of the paddle, while the thickest parts (up to $\frac{1}{4}$ of an inch thick) were out towards the

¹⁰³ For the technology of early red-on-buff wares see: Woodward, 1931, pp. 15-16; Hawley, 1930b, p. 524; Haury, 1932, pp. 72-86; Gladwin, W. and H. S., 1933; Gladwin, Haury, Sayles, and Gladwin, 1937, p. 171, *et seq.*

¹⁰⁴ Gifford, 1928; see also Fewkes, 1941, pp. 162-164.

¹⁰⁵ Russell, 1908, pp. 126-131.

¹⁰⁶ Woodward, 1931, pp. 15-17.

¹⁰⁷ Haury, 1932, pp. 64-65.

edge of the anvil. The scraping of interiors, as practised by the Pueblo Indians, not only erases all irregularities — which in a coil-made pot would naturally be less than in a paddle-and-anvil made specimen — but at the same time it serves to reduce the thickness of the vessel wall to approximately the same dimension in all parts. This is seen in the sectioned sherd in figure 26, *b*, of coil-made Gila Polychrome from Los Muertos with an average thickness of $\frac{3}{16}$ of an inch.

Exteriorly, when the surfaces were not too extensively smoothed by hand rubbing, the paddle facets are clearly visible. They occur most frequently on bottoms, particularly on small vessels.

In general, the red-on-buff vessels from Los Muertos have relatively thicker bottoms than sides, and thinning continues towards the upper parts of the vessels. This is apparently due to the fact that most of the shaping took place here.

The bottoms of two of the largest jars in the collection show that shallow flat molds were used to support them during the formative process. This is a device which Russell¹⁰⁸ reports as still being in use among the Pimas, and one which is also in use among the Pueblo potters,¹⁰⁹ although the products of the latter rarely show the mold impression. In the jars at hand, this feature is very pronounced (fig. 27, *d* and *e*; pl. 6, *a* and *d*) and it is very evident that the use of the mold exerted a secondary influence altering the shape of the pot.

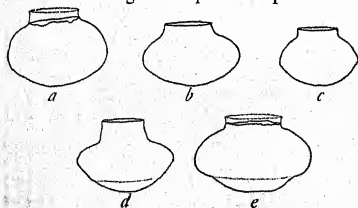


FIG. 27. Los Muertos. Casa Grande Red-on-buff jar shapes. Diameter of *e*, $1\frac{1}{2}$ inches.

Paste: The prevalent color is a reddish-brown. The general composition is about the same as in the earlier forms of red-on-buff, al-

though it tends, in some examples, to fire to a darker reddish hue. Jars which have passed through a secondary crematory fire often show a brick-red. Dark cores in the vessel walls are almost never seen, due probably to less organic impurities in the clay rather than to perfect firing. The paste is readily scratched with a knife, the cleavage irregular and jagged, and the edges crumble readily. The paste is highly pervious. A hard and fast rule cannot be given for the tempering material since there is considerable leeway as to size, quantity, and quality. Basic ingredients which seem to have been most commonly used are: quartz grains, either angular or rounded; schistose rocks, usually mica bearing; free mica; and other heterogeneous mineral substances. In general, the binding material is angular, indicating that rocks were crushed for the purpose; the size of individual particles frequently equals one-half the width of the vessel wall and the quantity is liberal. Free mica was probably not consciously added, as it is omnipresent in the soil and clay beds of the region and would be almost impossible to exclude from any clay prepared by the potter. Small glistening flecks of mica are invariably visible on the surfaces, even when these are decorated.

A peculiar pitted surface is often seen on both interior and exterior surfaces of vessels, a condition which does not normally occur, if ever, on other Southwestern wares. Owing to the transient nature of one of the tempering ingredients, the particles nearest the surfaces have disappeared, leaving their casts behind. Some of the pores measure as much as $\frac{1}{8}$ of an inch in diameter and in depth. The openings are smaller than the diameters, thus indicating that the substance passed out of the paste in solution or in the form of powder. In fresh breaks, the pores are sometimes seen to extend into the interiors of the vessel walls, and not infrequently still contain a white powdery substance. Obviously, the porosity of the paste, caused by this disappearing material, was governed by the amount that was added to the base clay. This surface disfiguration undoubtedly postdates the Indian use of the vessels for the following reasons: (a) the paint does not extend into the pores, suggesting that they

¹⁰⁸ Russell, 1908, p. 126.

¹⁰⁹ Guthe, 1925, p. 27.

were not formed when the vessels were decorated, and (b) the very fragile edges of the openings to the cavities would have been broken down during usage. Hence, it appears that a chemical reaction on soluble or otherwise impermanent ingredients, which may have been weakened and broken down during the firing process, took place during the years the pottery has lain buried.

Slip: A true slip was probably never applied. A thin, semi-transparent wash, through which the color of the paste is often seen, however, was applied with a cloth or mop in large sweeps. The wash color is a light buff, and covers the visible surfaces. It was not thoroughly fixed to the base paste by firing as it can sometimes be washed off.

Pigment: Decorations were applied with a thin, lifeless, brownish-red paint, often fugitive, and sometimes seen only as a faint pinkish stain. This contrasts directly with the rich maroon and more permanent paint on earlier red-on-buff vessels. The base of the pigment is iron and its poor adhering qualities may be due to the underlying chalky wash. At times, however, the paint bit so deeply into the surface, that given the proper conditions, an etched effect was produced.

Finish: The polishing pebble was not used. Most of the smoothing was apparently done by hand to eliminate the facets left by the paddle and to provide a smoother base for the decorations. Surfaces are rough to the touch. In general, the finishing of rims and handles is less perfect in Casa Grande Red-on-buff than in Pueblo wares.

VESSEL FORMS

The twenty-six Casa Grande Red-on-buff vessels, whole or nearly so, may be classified as follows according to shape:

Jars	8
Pitchers	14
Bowls	2
Canteen	1
Scoop	1
	—
	26

The shapes fall mainly into two more or less stereotyped forms: jars and pitchers. Jars, with

modifications, persist from the earlier horizon, the Sedentary Period, and pitchers appear to be an innovation peculiar to the Classic Period. The flare-rimmed bowl of the Sedentary Period has become obsolete and was not replaced by any standard form in the Salt River region, if the current collection gives us a true picture.

Jars: The collection contains only three complete and five fragmentary jars of the Classic Period. Excepting one fragmentary specimen, these were found in the areas containing cremated human remains. Two general forms seem to be represented.

Jars with low necks (fig. 27, *b*, *c*; pl. 6, *b*), of which four exist, are from 9 to 10 inches in diameter, the orifice of each being equal to about $\frac{1}{2}$ its diameter. Characteristic of all examples is a vertical flattening of the body, a feature common to nearly all jar forms in the Gila-Salt region. Variations are shown by the more globular specimen, figure 27, *a*, with a moderately flattened bottom in which the greatest diameter is low as compared with the height; a second form, *b*, displays greater compression with the maximum diameter at a point about midway top to bottom (pl. 6, *b*); and a third form, *c*, which shows pronounced angularity reminiscent of the shoulder in Sacaton Red-on-buff jar.

Jars with tall necks (pl. 6, *a*) are represented in the collection by one complete, several fragmentary specimens, and many neck sherds. The vertical or cylindrical neck is one of the characteristic traits of Casa Grande Red-on-buff. The usual treatment is shown by the complete neck (pl. 6, *c*) broken from a storage jar of unusually large size. It was found in an old irrigation ditch north of Ruin XIII.

The body form of tall-necked jars varies considerably, the differences being due mainly to a high or low placement of the maximum diameter. There is a curious lack of standardization in this feature with the result that some uncommon shapes were produced. A type with flat upperbody and very high-set rounded shoulder (fig. 27, *d*; pl. 6, *a*) is perhaps less common than lower shouldered and more compressed types (see example from Las Acequias, pl. 77, *a*, *b*, for this type). Round-sided jars, (fig. 27, *e*; pl. 6, *d*) with strong top to bottom

flattening, form a third and less distinctive category, disregarding the mold-impressed base of the example shown.

The effect of the pottery mold in which the jar rested when being made was to break the smooth curve of the underbody. The extent to which the mold influenced the shape varied, as will be seen in plate 6, *a* and *d*; in the former, the expansion above the mold was only equal to the thickness of the mold; in the latter, the swelling was much greater. This feature is not to be seen on any of the polychrome jars from Los Muertos, but is common on the polished red ware jars from this ruin, on some of which it has been greatly exaggerated. It is undoubtedly a local and late, i.e., Classic Period, development in the region and therefore becomes an identifying trait. The nearest parallels in the Pueblo wares are probably to be seen in some of the modern painted wares of the Rio Grande.¹¹⁰

The use of the "Gila shoulder" — the sharp angle formed by the junction of the upper and under parts of jars — seems to have become almost extinct during the Classic Period.

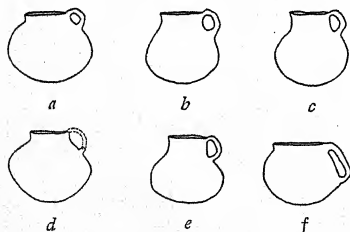


FIG. 28. Los Muertos. Casa Grande Red-on-buff pitcher shapes. Average diameter, $5\frac{1}{2}$ inches.

Pitchers: The fourteen pitchers from Los Muertos are extremely uniform as to size, the diameter ranging only from 5 to 6 inches, excepting one miniature. The general type may be described as being round to squat bodied with a low neck and moderately flaring rim. Diameters of the mouths average one-half the total diameter. Each pitcher is provided with a substantial handle, usually of strap, but sometimes of rod, type which rises above the rim

and is attached high on the upper body, thus providing a gripping space for only one or two fingers (fig. 28; pl. 7, *d*, *e*).

Bowls: These were probably not commonly made as the collection has only two small examples and a very few sherds. Their place was filled by the polished red ware bowls which occur in great numbers. The first bowl (pl. 7, *a*) is slightly oblong in shape, $4\frac{1}{4}$ inches

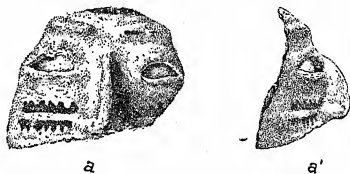


FIG. 29. Los Muertos. Red-on-buff effigy jar fragments. Front and profile views. Width, $2\frac{1}{2}$ inches.

in greatest diameter, and the rim has a slight elevation at one end forming a rudimentary tab as found on some scoops. Decoration is confined to the exterior in the form of a horizontal band. The second example (pl. 7, *b*) with flat bottom and nearly vertical sides, is decorated both inside and out (for interior pattern see fig. 37).

Canteen: A single specimen (pl. 7, *c*) falls into this class. It is a pear-shaped container, $5\frac{1}{2}$ inches in diameter with very small mouth and collared neck. It lacks the handles usually seen on Pueblo canteens and apparently has no prototypes in red-on-buff pottery.

Scoops: These were very abundant in Sacaton Red-on-buff of the Sedentary Period and appear to have nearly died out in Casa Grande Red-on-buff, although well represented in the polished red ware category of wares from Los Muertos. A single broken red-on-buff example is found in the collection of the type illustrated in figure 60, *b*. Decoration was restricted to the interior.

Effigy Jars: The presence of human effigy jars in the Hohokam ceramic complex is shown by a few sherds from the head portions, the best of which is illustrated in figure 29. Found in Ruin XIV, it is the upper part of a face. The eyes are modeled in a unique manner by ele-

¹¹⁰ Kidder, 1931, fig. 87, *b*.

vating the borders so that they rise above the original surface of the jar. Nostrils are indicated by two punched holes. Painted decoration consists of a broad line on the forehead, lines on the ridges above the eyes, along the lower borders of the eyes, and down the crest of the nose—the latter almost completely worn away—and horizontal lines on the cheeks dotted on the outer margins.

The surface of this face fragment is polished, and the pigment more permanent than is usual in the red-on-buff from the region in question, but the paste is analogous to locally made wares.

The source of the effigy vessel in southern Arizona has been summed up by Fewkes¹¹¹ as of "Mexican origin." He was under the impression that the type was restricted to late times and contemporary with the classic polychrome of Chihuahua where effigy forms were common. But with the excavation of Snake-town we know that the shape is an ancient one¹¹² among the Hohokam and need not necessarily be an importation. The effigy vessels in Casa Grande Red-on-buff are obviously a survival of earlier forms and Russell¹¹³ reports that in recent times the Pima Indians, occupying the former Hohokam area, made canteens in the form of human figures. The examples which he illustrates,¹¹⁴ both from the stand-points of modeling and painting, are strongly reminiscent of the example from Los Muertos.

DECORATION

Casa Grande Red-on-buff vessels are decorated in a more or less standardized fashion, the structure of which was undoubtedly derived from the prototypes of earlier horizons. The conception of the decoration is quite unlike the contemporary and companion Gila Polychrome ware of Pueblo origin, although it employs some of the same elements. It is essentially a rectilinear art. True curvilinear patterns are comparatively rare. This contrasts sharply with the more prevalent usage of curvilinear designs of the periods preceding the Classic. In addition, one may also call attention

to the more frequent use of life forms in the earlier types, tending towards the naturalistic. In Casa Grande Red-on-buff these have been lost.

As a rule, the designs are not particularly well done. Considerable skill in properly proportioning the field of decoration is seen but the brushwork is slipshod, the lines are wavering and variable in width. A fine line decoration is almost never seen, the average width being about $\frac{3}{16}$ of an inch. Usually the entire pot was painted with the same brush as line widths do not vary from one part of the pattern to another. Two exceptions to this show

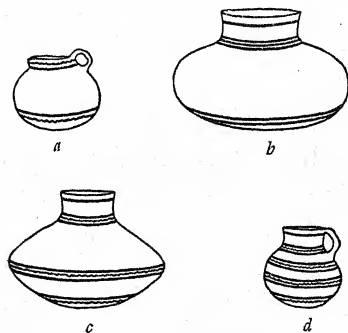


FIG. 30. Variations in the band arrangement of the field of decoration on Casa Grande Red-on-buff.

in hachured areas where the framing lines are heavier than the filling lines. The absorbent and rough nature of the lightly washed, but unpolished surface, undoubtedly reduced the possibilities of a more refined style of ornamentation.

The incised or scored decoration on exterior surfaces of Pioneer and Colonial Period types was completely lost by Classic Period times.

Band Arrangement: The formalized mode of presenting the painted decoration was in the nature of a horizontal band. All Casa Grande Red-on-buff vessels from Los Muertos are consistent in this feature. The number of bands or

¹¹¹ Fewkes, 1904, pp. 189-192.

¹¹² Gladwin, Haurly, Sayles, and Gladwin, 1937, pp. 194, 223.

¹¹³ Russell, 1908, p. 129.

¹¹⁴ Russell, 1908, pl. XIX, d.

zones was dependent, in part, upon the shape of the vessel.

Zones: On jars or pitchers with low or absent neck, there was a single, broad decorative band (fig. 30, *a*) extending from just below the rim to a point well down on the under side of the body. On vessels with vertical necks, a second band (fig. 30, *b*) was added in order to cover the increased area. On large shouldered jars, as seen in fragments, the body

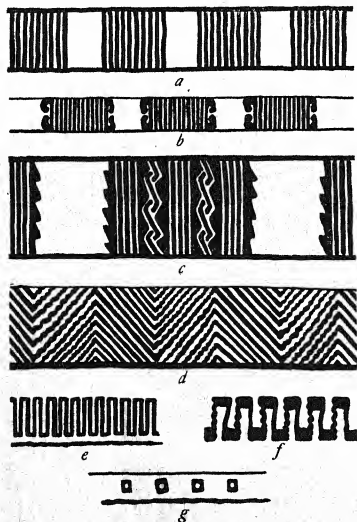


FIG. 31. Variations in the treatment of neck bands on Casa Grande Red-on-buff jars and pitchers from Los Muertos. Height of *a*, 3 inches.

band was sometimes divided at the shoulder, (fig. 30, *c*) thus providing one band each for the neck, the upper body, and the under body. Occasional sherds, and the jar in plate 6, *d*, (also fig. 30, *d*), show that narrow horizontal repeated bands were also employed. Two bowls in the collection have single bands on their exteriors.

Framing Lines: The lines framing the zones were usually of the same width as the decorations themselves. Between zones a free

line, usually wavy, was added. This type of line dates back to jars of the Colonial and Sedentary Period when it was frequently used as a framer.

Band Layout: Two distinct systems were used in filling the neck and body bands with the result that the neck ornamentation bears only little resemblance to the body decoration that may occur on the same jar.

The neck band was customarily divided into three or four panels, each separated from the other by an unpainted space smaller in extent than the panels proper. The panel designs consist mostly of vertical lines, with or without modifications. Figure 31, *a* shows the simplest method; in *b* curls have been added to the structure; while in *c* the set of vertical lines is broken up by introducing small panels of interlocking lines. To the outer lines of each group have been added solid triangles to form a saw-toothed edge, a highly characteristic treatment. A less common form is shown in example *d*, where the neck is filled completely with a chevron pattern of alternating straight and wavy lines. A more dominant form, again, is a rectilinear meander which completely encircles the neck and is confined in a space set apart by the conventional framing lines that make the band. A variant form, *f*, embodies the use of the wavy line in the meander. Small isolated units, as in *g*, are seen in only one case.

The standard subdivision of the body band, whether single or double, was based upon a system of triangles rather than upon rectangles as was the case in the neck bands. The result obtained, in the most complicated patterns, was quite unlike that of the average Southwestern decorated jar. Two broad types can be distinguished: Type I is more or less elementary in which triangles were appended to the framing lines; Type II patterns are those in which these triangles become a part of a larger design resembling in its basic line the weave of a textile.

Returning for a more specific account of Type I patterns, we see that in figure 32, *a*, the units of decoration are simple equilateral triangles, each filled with hachure directed oppositely in the two sets of triangles. The first two units show only the framework for emphasis. In *b*, a secondary triangle has been drawn within the first in order to break the

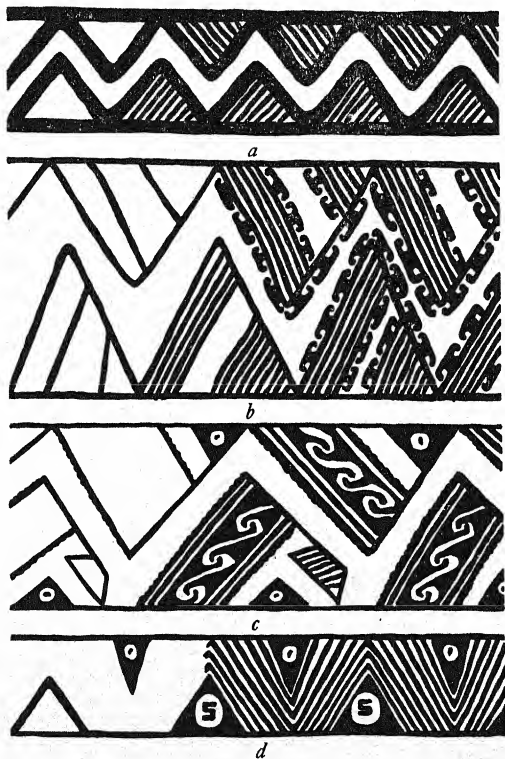


FIG. 32. Structure and variations in Type I designs of Casa Grande Red-on-buff from Los Muertos: *a*, *b*, *d*, pitchers; *c*, canteen.

field into smaller parts to attain a greater variation in pattern. Hachure still plays an important part and further distinctiveness is gained by adding the "T"-shaped elements to the borders. Pattern duplication is seen in all units. This symmetry, as to shape of the unit and the decoration, is broken in *c*, where the

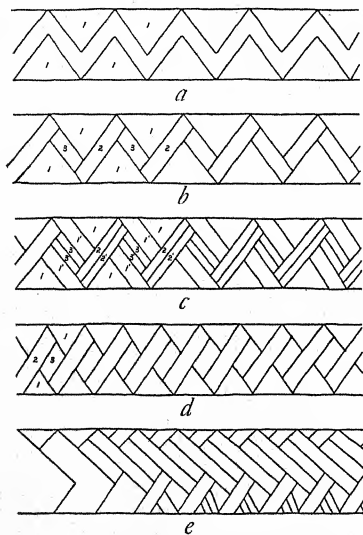


FIG. 33. Analysis of structure of Type II patterns occurring on Casa Grande Red-on-buff from Los Muertos.

triangles springing from the upper and lower framing lines have dissimilar shapes and treatment. By cutting off a small corner of the triangles in the lower series, they have been converted into trapezoids displaying a three-fold division of the field, each of which is different. The upper triangles show a simplified two-fold division. The foregoing designs all have zigzag negative patterns formed by the free space between the triangle units. Consequently, when jars or pitchers with this type of design are viewed from above, a striking star-

shaped pattern is seen, which may have from three to eight points, depending upon the number of units.¹¹⁵ The zigzag unpainted band is sometimes filled in, as shown by *d*, where solid triangles with small element inserts are bordered by parallel sets of lines.

Type II patterns are really made by intensifying the type just discussed. The triangle (fig. 33, *a*₁) still forms the basis but is made less conspicuous as a unit of design by other modifications, principally in the area lying between them. The parallel hypotenuses of two opposing triangles were extended across the zigzag interspace until they touched the hypotenuses of the triangles opposite, thus creating long, oblique rectangular panels (fig. 33, *b*₂). Automatically, there were formed small rectangular tertiary fields (fig. 33, *b*₃). Each one of these three fields could then be subdivided at the discretion of the artist (fig. 33, *c*) to lend further complexity to the pattern, although the actual structure was relatively simple. The width of the oblique panels and the shape of the smaller intermediate fields could be altered by reducing the size of the basic triangles, or, by shifting their medial apices laterally as in *d*. A still more complicated result was obtained (fig. 33, *e*) by extending panels obliquely in counter directions from both upper and lower triangles so that they met near the center of the band and crisscrossed in herring-bone fashion. With a few slight modifications, this pattern is really an amplification of the bands shown preceding it (*d*) by doubling the amount of the framework. The completed forms of four specific patterns, ranging from the more simple to the complex, are illustrated in figure 34, *a* to *d*. Straight and cross-hachuring and interlocked figures were very widely used as fillers. In pattern *e*, the triangle-panel system is more or less broken down but the same feeling is maintained by the use of an involved interlocking key motive.

The effect of Type II designs, if the openwork is not too great, is like the weave of a textile. Where the panels are in more perfect alignment, the "warp" and "weft," as it were, can be traced in an under and over style.

This decorative scheme appears for the first time in Hohokam pottery in Sacaton Red-on-jar with the same motive.

¹¹⁵ Kroeber, 1925, pl. 62 (lower) shows a Cahuilla

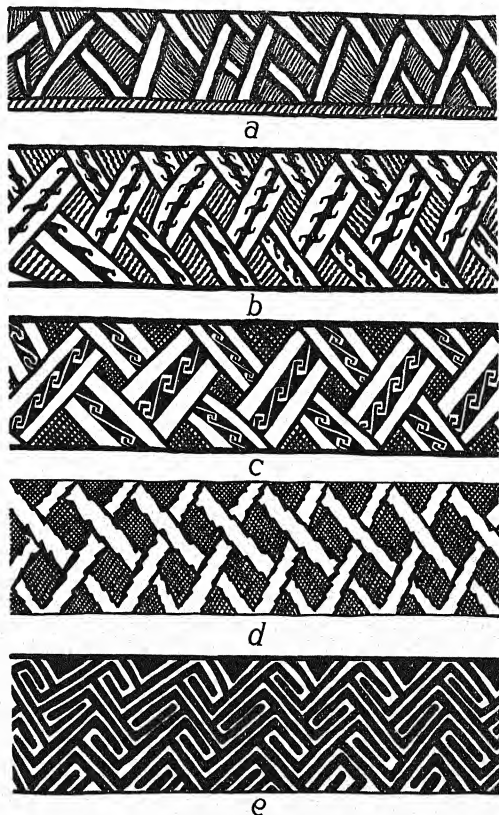


FIG. 34. Type II designs on Casa Grande Red-on-buff from Los Muertos:
a, e, pitchers; *b, c, d*, jars.

buff of the Sedentary Period.¹¹⁶ From this it was obviously inherited by Casa Grande Red-on-buff but attended by a rather marked degeneration which was characteristic of the type in general. Schroeder¹¹⁷ has indicated the belief that the style was derived from Roosevelt Black-on-white. A similarity does exist but it seems more likely the design can be accounted for by the fact that the Roosevelt Black-on-white "woven" pattern was originally inspired by Hohokam colonists in the Roosevelt-Globe area. With prototypes at home there was really no necessity of going outside the Gila-Salt area to find the inspiration for the design.

No attempt has been made to type the examples shown in figure 35 as there is just one instance each of the patterns represented. The first three — *a*, *b*, and *c* — are found on pitchers: *a*, a broad band of interlocked spirals which carried back into the types of the Colonial Period; *b*, an aberrant design of half concentric circles; *c*, a fragmentary pitcher showing repeated narrow bands bearing an interlocking motive with wavy separating lines; and *d*, the pattern from a crudely made jar, probably the work of a novice.

If the Casa Grande Red-on-buff from Los Muertos may be regarded as typical of the Classic Period in the Gila-Salt region, and there is no reason for assuming the contrary. Types I and II patterns were normal. They occur on eighteen of the twenty-six complete, or nearly complete, vessels in the collection, and they can be recognized on about eighty per cent of the Classic sherds from this ruin. Confirmation of this is found in the pottery from Las Acequias.

Elements of Design: The repertoire of design elements possessed by the Classic Period potters was not very large. The decorative tradition was essentially derived from the preceding red-on-buff types, while a few are attributable to contact with the Pueblo potters. A certain amount of duplication of elements will be seen by comparing the current red-on-buff elements with those listed later occurring on the polychromes, but their manipulation in each is quite distinct. The greatest initiative in the decorative art of ceramics during the

Classic Period seems to have been in the laying out of the full pattern rather than in the treatment of the individual elements and units; but at best it was little more than a dispirited treatment of Sedentary Period forms.

Lines: As fillers for rectangular and triangular areas and as framers, lines play a prominent part. They are usually poorly drawn, may be variable in width, due to greater or lesser pressure on the brush, and frequently run into each other when drawn in parallel sets. Sometimes an entire pattern was produced by simple lines arranged in chevron fashion (pl. 7, *e*). Wavy lines share almost equally with the straight lines in importance. They are used as band framers (fig. 30, *a*, *c*, and *d*) and in conjunction with straight lines as in figure 31, *d*. This use is distinctly a survival from preceding forms where it was very commonly employed. Hachuring, both straight (figs. 32, *a* and *b*; 34, *a* and *b*) and crossed (figs. 34, *c* and *d*; 36, *a*) occurs frequently; wavy hachuring in small areas or in bands is less common, and occasionally a checkerboard hachuring (fig. 36, *b*) is seen.

Dots: These were not widely used. They appear chiefly within solid rectangular or triangular patterns (figs. 32, *c* and *d*; 36, *c*) as solitary elements and less commonly in series as in figure 36, *d*.

Small Elements: The varied small elements which constituted such an important part of the decoration in earlier types of red-on-buff are seen only as survivals. The angular "S"-shaped element in figure 36, *e*, occupies a favorite position within a solid triangle. There are only two cases of repeated small elements (fig. 36, *f* and *g*) in bands which show the typical use of "alphabetical" symbols, "H" or "I" — depending upon the point of view — and an inverted "Z."

Serrations: This device assumes either the form of a moderately serrated margin of a unit decoration (fig. 32, *c*) or a pronounced sawtooth character (figs. 31, *c*; 34, *d*), both of which were quite widely used. Opposed serrations in small panels may be seen in figure 36, *g*. The serrating of one side of a triangle as figure 36, *b*, is rare during the Classic Period.

¹¹⁶ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CLXIV.

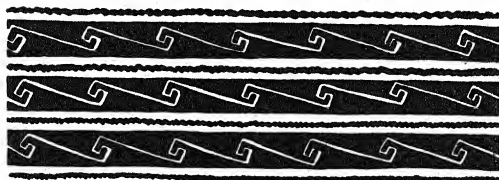
¹¹⁷ Schroeder, 1940, p. 125.



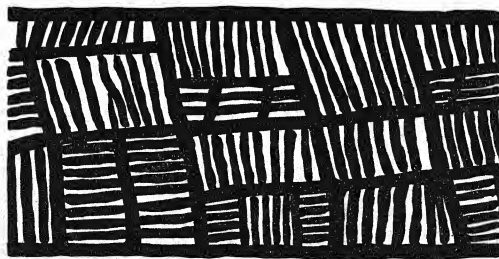
a



b



c



d

FIG. 35. Variations in the style of treatment of body bands in Casa Grande Red-on-buff from Los Muertos: *a*, *b*, *c*, pitchers; *d*, jar.

TRIANGLES: Small triangles, either solid or with dotted centers, provide convenient starting points for some of the simpler patterns (fig. 32, *c* and *d*).

HOOKEED AND INTERLOCKED ELEMENTS: The Classic Period potters were habitual users of a simple figure, formed by a right-angled line or crooked appendage extended from one side of an isosceles triangle. It occurs along margins

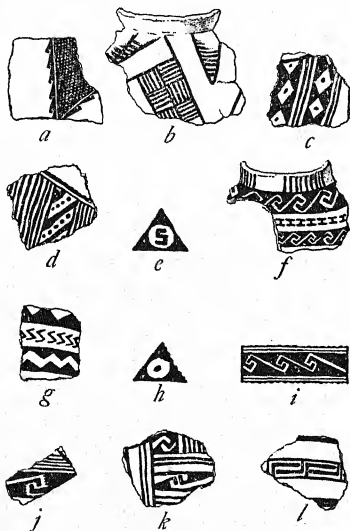


FIG. 36. Los Muertos. Elements of design on Casa Grande Red-on-buff. Width of *a*, about 4 inches.

of panels (fig. 36, *a*) but more often as the decorative figures within panels (figs. 32, *c*; 36, *f*), in which cases it is interlocked. Again, it may be represented as a series of interlocking free elements (fig. 31, *c*) but with a complement of small solid triangles. Further variations in the use of this element are shown in figure 36, *k*, and *l*.

Actually, this figure is merely the curvilinear scroll gone rectangular. The scroll, usually interlocked, was one of the outstanding design

elements almost from the beginning of Hohokam pottery painting¹¹⁸ and for most of its history it was never drawn except in the curved form. By late Sedentary Period times a tendency towards rectilinear forms showed itself and this culminated in the Classic Period. In the entire Los Muertos Collection of red-on-buff, there were only two instances of the curvilinear scroll (fig. 35, *a*).

LIFE FORMS: These followed the same course of near extinction as the curvilinear scroll. The prevalent use of a repeating series of animal

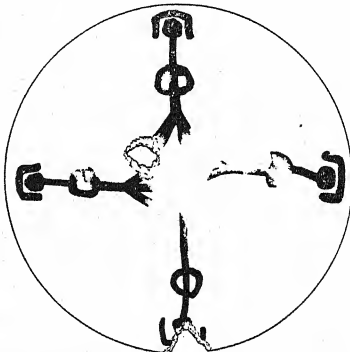


FIG. 37. Design on interior of small Casa Grande Red-on-buff bowl from Los Muertos. Diameter, 4 inches.

figures, or even human forms, in the Colonial Santa Cruz Red-on-buff has no equivalent in Casa Grande Red-on-buff. A very crude attempt at depicting human-like figures (fig. 37) constitutes the interior decoration of the bowl reproduced in plate 7, *b*. Arms are lacking on each of the four figures, otherwise the forms could certainly be identified as human. A curious crescent-shaped object covers the "head" in each case.

Intrusive Red-on-Buff

Cushing found a small amount of pottery at Los Muertos which represents trade from adjoining areas. It has been established through recent studies that red-on-buffs and red-on-

¹¹⁸ Gladwin, Haury, Sayles, and Gladwin, 1937, fig.

browns occur to the southwest, south, and east of the Gila-Salt area, some directly related to the Hohokam, others influenced to a considerable extent by the red-on-brown of the Mogollon Culture. In each case, tentative phase sequences have been established and ideas may be expressed as to where certain pottery types belong with respect to others. For this reason the foreign red-on-buff at Los Muertos is much better understood now than it could have been a few years ago.

One of the neighboring areas where the contact with the Gila-Salt was maintained on an intimate basis was in the Santa Cruz drainage about Tucson. During the Pioneer Period here the complexion of the culture seems to have been almost entirely Hohokam, and through succeeding periods, although the phases can be correlated with those of the Gila-Salt area, there was a gradual drawing away from the more purely Hohokam pattern due to the apparent influence of the Mogollon Culture from the east.¹¹⁹ By late Classic Period times, the Tucson region experienced the same influx of Salado as did Los Muertos with a number of attendant changes.

Pottery from this region reached Los Muertos in some abundance (twenty-five sherds). Unfortunately, the field catalogue does not give, in most cases, the provenience of each sherd, but it is clear that they were found in direct association with Casa Grande Red-on-buff and Gila Polychrome. The type is known as Tanque Verde Red-on-brown¹²⁰ (pl. 8) and was in vogue in the Tucson area through the early part of the Classic Period and appears to have persisted through the late Classic Period in the Papaguera.¹²¹

Connection with the east area is represented by a single sherd of the thin-walled San Carlos Red-on-brown type from the vicinity

of Globe.¹²² It occurs only, as Schmidt pointed out,¹²³ in Gila Polychrome sites. Schmidt figures a bowl of the type from Togetzoge¹²⁴ and it has also been found at Gila Pueblo, dating in the late 1300's, associated with Gila Polychrome in burials.

POLYCHROME

Gila Polychrome

The polychrome pottery found at Los Muertos was one of the most far-flung types of the Southwest. Its range may be defined as extending from the Mogollon Rim on the north to the Mexican border on the south, and from Gila Bend on the west into New Mexico and sporadically into Texas on the east. Areas of concentration are found in the Tonto Basin, along the Gila from Safford to Phoenix, in the lower Verde Valley, and in the chief southern tributaries of the Gila, particularly in the San Pedro and Santa Cruz valleys.¹²⁵ Its makers were the members of the Salado Culture,¹²⁶ a southern and apparently aggressive increment of the Anasazi. There is much to be learned about this seemingly important class of pottery. The regional types are not yet known, its affinities with other Puebloan pottery are not too well understood, and we still are not fully informed as to its development. Fortunately, the late horizons have been pretty accurately gauged as will presently be shown.

For the origin of polychrome we must look to the northeast, to the region lying between the Mogollon Rim and the Little Colorado River. Its probable beginning here has been pointed out in previous publications.¹²⁷ The oldest polychrome type in the Salado series is known as Pinto Polychrome,¹²⁸ which is confined in range mainly to the Tonto Basin, extending south to Globe but seldom west of this

¹¹⁹ Kelly (in preparation).

¹²⁰ Described by I. Kelly (unpublished), based on excavations in the Hodge's Ruin near Tucson. The choice of brown in place of buff as a descriptive term is largely an arbitrary distinction and has been applied chiefly to the polished decorated types as opposed to the unpolished red-on-buffs.

¹²¹ Scandling, 1940.

¹²² Vickrey, 1939.

¹²³ Schmidt, 1928, p. 298.

¹²⁴ Schmidt, 1928, p. 299, fig. 31; also see Hawley, 1930b, pl. 8, *a* and *b*.

¹²⁵ Gladwin, W. and H. S., 1930c, p. 7.

¹²⁶ Gladwin, W. and H. S., 1930c, pp. 3, ff.

¹²⁷ Gladwin, W. and H. S., 1930c, p. 5; Hawley, 1930b, p. 532. Current studies in the Fort Apache Indian Reservation by the University of Arizona are strategically placed to obtain further information on this problem.

¹²⁸ Gladwin, W. and H. S., 1930c, pp. 4-5; Colton and Hargrave, 1937, pp. 87-88.

point. The evolution of this polychrome from Little Colorado prototypes probably did not begin much earlier than about 1200. Obviously, this limits the whole life span of the Pinto Polychrome and its allied forms into the few centuries preceding the Spanish entry into the Southwest.

Out of Pinto Polychrome grew Gila Polychrome,¹²⁹ the type strongly represented at Los Muertos. With its development the polychrome area was widely extended to include the Gila Basin, and the regions to the south and east. The earliest polychrome sherds encountered by Gladwin¹³⁰ and Schmidt¹³¹ in their respective stratigraphic studies in the Gila and in the Salt were of the Gila variety. Historic dates, based on tree-rings, can be ascribed in a broad way to this type. It is found to a limited extent in the cliff ruins in the Sierra Ancha region which have yielded dates in the first two decades of the 1300's,¹³² at Kinishba with tree-ring dates in the thirteenth and early fourteenth centuries,¹³³ and at Gila Pueblo with dates in the fourteenth century,¹³⁴ the latter being a "pure" Salado ruin.

Tonto Polychrome,¹³⁵ also represented in the collection from Los Muertos, is a variant of Gila Polychrome. It was probably a later evolution, although Gila Polychrome persisted and was contemporaneous with it. Tonto Polychrome is distinguished by its use of red with the black and white as a decorative color, while Gila Polychrome employs only black and white in patterns, and red was used to cover those areas not ornamented.

The richest source of polychrome vessels in Los Muertos proved to be the burials. In harmony with the burial custom in polychrome ruins to the north and east, as for example, Besh-ba-gowah near Globe, the dead were interred below the floors of the domestic rooms or within the small court enclosures found in practically every ruin unit. Twenty-eight polychrome containers of various sorts were thus found as funerary accessories; eighteen were found in rooms, and six came from the cremation areas. One of these contained

burnt bones and the others were offerings associated with the cinerary urns in which the burnt bones were enshrined. In comparing the distribution of polychrome with red-on-buff from burials, cremations, and rooms in Los Muertos, we find a factor of significant value. Only five red-on-buff vessels were found with inhumations and there were an equal number of polychrome containers with cremations. In the absence of stratigraphic studies from Los Muertos, such evidence tends to indicate the contemporaneity of these diverse pottery types and burial customs. But the chief point lies in the fact that, while polished red ware was associated with both types of burial, a fairly sharp line was drawn when it came to placing decorated wares with the dead, red-on-buff being dominantly associated with cremations and polychrome with earth burials. This argues that each group maintained its inherited burial form, even after a joint occupation had been set up.

While Gila Polychrome has been described briefly in the literature, it is clear that these descriptions are generalized and do not consider the type from a regional standpoint. Pottery with as wide a distribution as Gila Polychrome was probably not exactly the same wherever it occurred unless all of it was produced in one limited area from which it spread via trade channels. This is one of the first things which needs to be settled and perhaps the simplest approach at the present time is to make detailed studies of local collections, as is attempted here, to determine the presence or lack of uniformity.

Whether Gila Polychrome was actually made at Los Muertos or in any ruins of the Gila-Salt is still a debatable point. Quantitatively it would appear to be local; qualitatively it may prove to be imported.

Gila and Tonto Polychromes from Los Muertos, were made by coiling in the true Pueblo fashion and they are, therefore, distinct technologically from the red-on-buff of the Hohokam. The method is seen in an occasional polychrome bowl which was not smoothed

¹²⁹ Gladwin, W. and H. S., 1930c, pp. 6-7; Colton and Hargrave, 1937, pp. 88-90.

¹³⁰ Gladwin, 1927.

¹³¹ Schmidt, 1928.

¹³² Hauray, 1934a.

¹³³ Baldwin, 1935, p. 30.

¹³⁴ Hauray, 1937, p. 3.

¹³⁵ Gladwin, W. and H. S., 1930c, pp. 8-9; Colton and Hargrave, 1937, pp. 90-91.

exteriorly. A small complete bowl from Los Muertos (pl. 9, *a*) shows the upper two-thirds of the outer surface coiled and the bottom smoothed. Both surfaces were slipped and lightly polished. These are customary treatments in Gila Polychrome, excepting that portion in which the coils are evident. Additional sherds (pl. 9, *b'*, *c'*) illustrate further variations of coiling. Referring again to figure 26, illustrating cross sections of vessel walls, it will be noted that the polychrome from Los Muertos was of uniform thickness, in contrast to the variable thickness of the red-on-buff type.

sible for the pored surface of the latter. The tempering particles are both round and angular and appear to be mostly quartz. The uniform fineness would suggest that the ingredients were sifted before admixture with the clay. The quantity can be described as constituting from twenty-five to thirty-five per cent of the paste. This richness of tempering may be held accountable for its crumbly character and perhaps for the exfoliation seen in a large number of the specimens. Mica in the paste is rare. The average vessel wall thickness is $\frac{3}{16}$ of an inch.

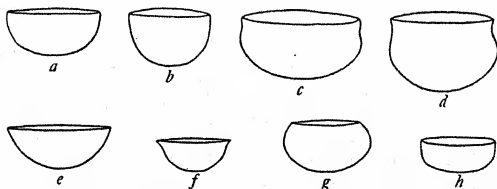


FIG. 38. Los Muertos. Gila Polychrome bowl shapes.

TECHNOLOGY

Paste: The clay used in Gila Polychrome was obviously not the same as that of Casa Grande Red-on-buff and the tempering materials added to it were also different. Although both types were fired in an oxidizing atmosphere the color of Gila Polychrome is a deep brown to red as contrasted with a light buff in the other, and vessel walls show in section, almost without exception, a carbon streak in the middle ranging from gray to black. This central black zone was due to the carbonization of organic matter probably inherent in the clay, and it is flanked on both sides by the thin layers of paste from which all carbonaceous matter has been driven. The carbon streak in jar sherds tends to run to the interior surface indicating that the oxidation process did not effect the insides of the small-mouthed vessels.

Tempering material is far more homogeneous and finer than that of red-on-buff, and it lacks the soluble material which was respon-

Slip: Both Gila and Tonto Polychrome show the use of two slips, red and white. Exteriors of Gila Polychrome bowls and the bottoms of jars were slipped red, and the white covers bowl interiors and the major part of jar exteriors. Contrary to previous descriptions, the red was not first applied to the whole body of the jar or bowl, followed by white on those zones which were to carry the black design. It occurs only on those areas not covered by white. Red, moreover, was not put on until after the white had been applied and pebble polished (fig. 41). This order, at least, pertains to the specimens from Los Muertos. Jar rims for from 1 to 2 inches down on the inside of the necks were also slipped red and burnished.

In Gila Polychrome, red was never a background for designs in either black or white.¹³⁶ White areas, on the other hand, were always fully covered with black designs. A few jars and bowls show a red unpolished paint on a

¹³⁶ Gila Black-on-red, a companion type of Gila Polychrome in the Upper Salt, in the Gila from Globe east and in the Tucson areas, does, of course,

show this. For some reason, it did not show up at Los Muertos.

white background, supplementing the black. This was brought on, probably, by an increased tendency to carry the red slip between bands or irregular figures of white, as in the more advanced types of Tonto Polychrome.

Pigments: *White:* This was an earth paint, probably with a kaolin base. In consistency, it must have been thick and lumpy, since in the crevices on the effigy figures which were not reached by the polishing stone, it forms a coating as much as $\frac{1}{2}$ of an inch thick. The heavy body seems to have been responsible for two defects apparent in the white areas: a surface seamed with fine cracks, and the loss of the white by flaking away from the base, has-

a thin mixture of slip material, to insure its free flowing from the brush. It occasionally burnt black along the fringes of the lines.

Black: The designs were drawn in a dull, thin, black pigment, best characterized as having a faded and slaty appearance. Chemical tests of the black pigment in Gila Polychrome have shown it to be of vegetable origin, i.e., carbon.¹³⁷ The few vessels from the cremation area which passed through the crematory fires have almost completely lost the black design for this reason.

Finish: The surfaces of bowls and jars, before slipping, were hand-smoothed, leaving them rough to the touch. After slipping, all surfaces except jar interiors were pebble burnished. The strokes, usually run parallel to the rim, although towards the bottoms of bowls and jars they become more indiscriminate. Bowl exteriors have shallow dents, evidently the result of imperfect planing.

Firing clouds are present in practically all examples, but they are normally confined to the red areas of jars and bowls. They are small, as a rule, and occur often as light smudges rather than as sharply contrasted blackened areas. There is no direct evidence to suggest intentional fire clouding.

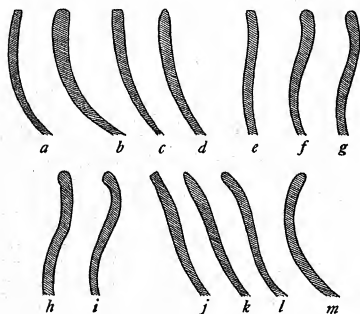


FIG. 39. Los Muertos. Rim sections of Gila Polychrome bowls. Height, about 3 inches.

tened by the crazing. That the seaming of the white slip following the drying is shown by the fact that when the black lines were applied, presumably before firing, the pigment occasionally followed the cracks out beyond the edge of the brush stroke.

Red: This is basically an iron pigment, derived from limonite or hematite. It ranges in shade from bright red to brown, depending probably on a combination of firing temperatures and compounding. Like the white, the red used as a slip appears to have been creamy in texture which worked down into a smooth surface when pebble polished. The red, occasionally applied over the white was evidently

VESSEL FORMS

Gila Polychrome and its related type, Tonto Polychrome, show a considerable variety of form. In the Los Muertos Collection bowls were favored, followed by small bottle-like jars, and lastly large jars. Less abundant, but none the less characteristic types, were bird effigy jars, ladles, oval and square bowls, mugs, human effigies, and other eccentrically shaped vessels. This diversification is not seen in the prototype, Pinto Polychrome. The increased enterprise in the potter's art coincides more or less with the territorial expansion of the Salado Culture. The Los Muertos vessels are classifiable in shape as follows:

Bowls	35
Jars	14
Ladle	1
Mug	1
Effigy	1
	<hr/> 52

¹³⁷ Hawley, 1929, pp. 749, 745.

Bowls: These can be classified into five groups according to shape and rim treatment. Both large and small examples occur in all groups excepting, perhaps, the last. They are given below in the order of their frequency, as determined from complete vessels and the sherd material brought in by the Expedition. The following complete examples are available for study:

A. Hemispherical	16
(1) Shallow	7
(2) Deep	9
B. Recurved	7
(1) Shallow	1
(2) Deep	6
C. Outcurved	9
(1) With direct rim	6
(2) With flared rim	3
D. Incurved	2
E. Oval	1
	<hr/>
	35

A. HEMISPHERICAL BOWLS. These are divided into two subgroups — shallow and deep. The subdivision is made on the basis that those examples whose height is less than $\frac{1}{2}$ the maximum diameter are shallow, while those whose height exceeds $\frac{1}{2}$ the maximum diameter are termed deep. In the shallow, hemispherical form (fig. 38, *a*; pl. 10, *a*, *a'*) the bottoms are relatively flat and the sides rise abruptly, once the curve upwards is begun. The rims are usually slightly incurved, but the diameter at the rim is seldom $\frac{1}{2}$ an inch less than the greatest width. There is a marked distinction between this type and the true incurved bowl. Rim edges are either squared or rounded, and there is sometimes a thickening of the vessel wall towards the rim (fig. 39, *a* and *b*). The seven shallow bowls measure from 5 to 7 inches in diameter, four individuals being almost exactly of the same diameter, $5\frac{1}{2}$ inches.

The deep bowls of this group (fig. 38, *b*) display more rounded bottoms and, on the average, less incurved rims. In almost all specimens the maximum diameter is at the rim, the edge being again flattened or rounded (fig. 39, *c* and *d*). The diameters grade imperceptibly from about 4 to 14 inches.

B. RECURVED BOWLS. These are distinguishable from the first group by rim treatment only, as they also fall into shallow and deep subgroups (fig. 38, *c* and *d*) on the same grounds as given above.

The deeper bowls of this group, which are in the majority, have rounder and fuller bodies

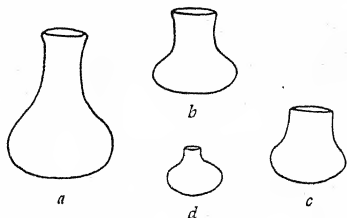


FIG. 40. Los Muertos. Gila Polychrome small jar shapes. Height of *a*, 8 inches.

than the shallow form and the heights are always greater than $\frac{1}{2}$ the diameters (pl. 10, *b*, *b'*). A series of sections showing the variations in rim treatment is shown in figure 39, *e* to *i*. The rim edges follow the customary treatment of either being somewhat flattened or rounded, and there is an observable swelling in the wall near the rim in most specimens. The average diameter of bowls of this type is about 9 inches, the range from about 4 to 10 inches.

C. OUTCURVED BOWLS. These constitute a group of shallow bowls distinct from the shallow subtypes of the preceding categories. The exterior contour of an outcurved bowl with direct rim is a symmetrical curve (fig. 38, *e*; pl. 10, *c*, *c'*). The sides in no instances approach the vertical, the maximum diameter being thus at the rim. Depths are always less than $\frac{1}{2}$ the greatest width. Rim edges, if squared (fig. 39, *j*), are directed outward; they may be rounded and there is one instance of a sharpened edge (fig. 39, *k*). Diameters range from 5 to $10\frac{3}{4}$ inches.

Three bowls with slightly out-turned or flared rims comprise the second subtype in this group (fig. 38, *f*; pl. 10, *d*, *d'*). This feature was apparently limited to small bowls (diameters $4\frac{1}{2}$ inches to $6\frac{1}{2}$ inches). Rim edges are usually rounded (fig. 39, *l*).

D. INCURVED BOWLS. These run to small sizes ($3\frac{1}{4}$ to $6\frac{1}{2}$ inches), have a decided drawing-in of the rim (fig. 38, g; pl. 10, e), and are distinguishable from the others, in addition to form, by the outside decoration; the inside may or may not be slipped but is never decorated. The rim edges are rounded (fig. 39, m).

E. OVAL BOWLS. There is only one fragmentary example answering this description (fig. 38, h), although complete bowls are known from other ruins in the Gila. The length was probably about 6 inches. A related form is the squared bowl which is not represented in the Los Muertos Collection.

Jars: Jars can be divided into two classes: small and large. Each of these classes in turn has minor subdivisions, depending upon shape variations. Tendencies common to both main groups are elongated necks, bodies manifesting a top to bottom flattening, and orifices which are smaller than $\frac{1}{2}$ the maximum diameter of the jar.

SMALL JARS: Undoubtedly one of the most graceful forms of vessels ever manufactured in the Southwest was the long-necked, bottle-like container, of which an outline drawing is given in figure 40, a. A single specimen of this type was found in a cremation area of one of the units of Los Muertos. The type was not a particularly rare form, as numerous examples exist from other polychrome ruins. Its measurements are: diameter, 6 inches; diameter of orifice, 2 inches. Vessels of this type were seldom more than 8 inches in height. Variations from this pattern are illustrated in plate 11, b, c, which illustrate a tendency in this class of vessels to compress the body and add thereto a disproportionately large neck.

The small ($3\frac{3}{4}$ inches) full bodied vessel shown in figure 40, d is not typical of this class of jars.

LARGE JARS: There are five complete large jars and several fragmentary specimens from Los Muertos. The diameters range between 10 and 14 inches, the height in each case is less than the diameter, and the diameters of the mouths are less than $\frac{1}{2}$ the total diameters. Rims are everted and the edges rounded. As in the small jars, there is a noticeable correla-

tion between neck height and body form. The fuller bodied examples have shortest necks (pl. 12, c). With a progressive flattening of the body, the necks become increasingly lengthened (pl. 12, a, d, and e). There is, moreover, a relation between neck height and the size of the orifice, i.e., the higher the neck, the smaller the mouth. In e the greatest constriction of the orifice is about two inches below the rim; in d, it is just below the rim. The prevailing neck form is more conical than cylindrical. In polychrome jars there is no angularity of the sides, nor are there mold impressions on the base, features which were pointed out as appearing on the Casa Grande Red-on-buff and Gila Red vessels of the Classic Period.

Ladles: These are represented by a single handle fragment. Gila Polychrome ladles were of the half-gourd type¹³⁸ and appear to have been comparatively rare. They are of interest because of their consistent difference in form from the ladles or scoops in red ware which were so numerous in Los Muertos. It is not clear why the half-gourd type — an early form — should have persisted in the south when, in the peripheral area to the north, the bowl-and-handle type was in vogue.

Mugs: There is one complete example (pl. 11, d). Its dimensions are: height, $4\frac{1}{2}$ inches; diameter at rim, $4\frac{1}{2}$ inches. Mugs are one of the rare forms of Gila Polychrome vessels and were obviously inspired by the equivalent types in Gila Redware.

Effigy Jars: Effigy vessels in the Gila-Salt region occur most frequently in polychrome. Even so they represent only a very small per cent of the total output of polychrome pottery. Bird jars are best known, followed by human and rarely animal effigies.

From Los Muertos there is but one complete example of a bird effigy (pl. 11, e) and several noteworthy interesting fragments. The customary method of making bird effigy jars was to add to a rather squat jar a head and tail in plastic features. In some instances an effort was made to have the body of the jar simulate that of a bird. Sometimes wings were also added in the form of slight elevations or ridges, but more often these were represented by

¹³⁸ For illustration of a ladle of this form see Gladwin, 1928, p. 21.

painted designs. The jar illustrated shows only the head and tail, attached to an otherwise normal jar. Its length from head to tail is $7\frac{1}{2}$ inches.

A clear distinction may be drawn between the painted bird jars and those in red ware from

mouth seen in the red ware jars were apparently never employed on polychrome specimens.

Four fragments of bird jars represent identifiable species. One is clearly an owl and the three remaining are unmistakable imitations of the parrot or macaw. The owl sherd and

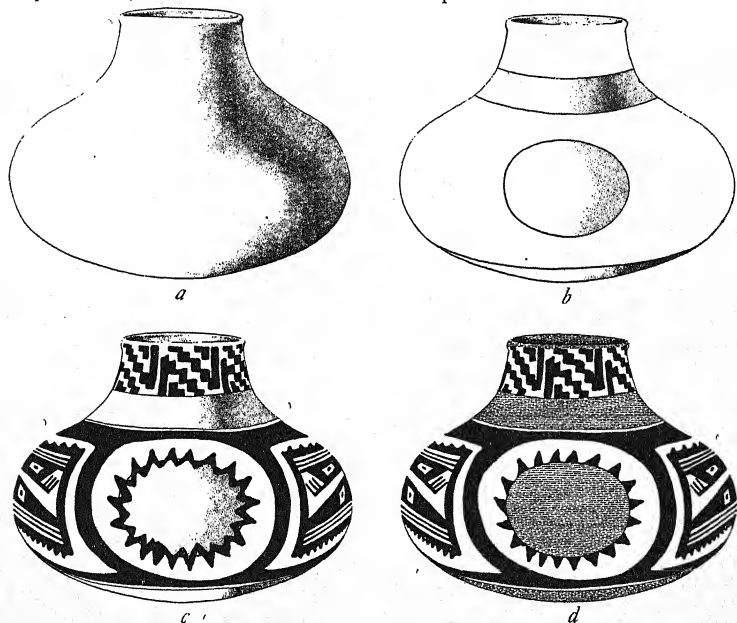


FIG. 41. Drawing giving the sequent steps in the ornamentation of a Tonto Polychrome jar: *a*, the unslipped jar; *b*, the white bands applied; *c*, the black designs applied on the white; *d*, the final applications of red to all parts not covered by white.

Los Muertos. From the description of these (pp. 98, 100), it is seen that the red ware forms accurately imitate the shape of a bird's body; the head is always lacking, although the tail and wings are usually shown in plastic additions, and the orifice is placed where the head of the bird should fall. In addition there is a handle extending from the rim of the orifice to the back. Handles and the style of

one macaw sherd (pl. 13, *a* and *b*) show modeling in relief as was the standard method in Chihuahua. This treatment is so much like the effigy vessels from Chihuahua that a relationship obviously existed.

The owl sherd, for example, is practically identical with a jar figured by Kidder from the Casa Grande region.¹³⁰ The chief differences in the effigy jars of the two areas are, of course,

¹³⁰ Kidder, 1916, pl. 1, no. 9.

the colors, and the development of the hood on which the features were modeled in the pottery of Chihuahua.¹⁴⁰ This device was apparently never used in Gila Polychrome.

The upper mandibles on the parrot heads (pl. 13, *b, c, d*) have been broken off but the lower short stubby mandible is present in two cases. The latter, as well as a small part of the throat, were painted black while the sides of the face bear white paint; the top of the head and neck are red and the eyes are dotted circles in black. In all details, these again are strongly similar to parrot jars that were made in Chihuahua.¹⁴¹ It is known, of course, that the peoples in the Southwest were acquainted first hand with the macaw so that the imitation here implied may not follow, but the small mannerisms of technique and the duplication in not only parrots but owls and also human forms certainly indicates relationship.

There is but one animal head in the collection (pl. 13, *e*). The snout part of the face and the ears have been lost and what there is of the specimen has a rather cat-like appearance. The eyes are disproportionately large bumps painted white and dotted in the centers. The hollow inside of the neck and head is just large enough to accommodate a finger around which the image was molded before attachment to the jar.

Human effigies consist of one small incomplete, but restored, jar (pl. 11, *a* and *a'*) and a face fragment (pl. 13, *f*). The jar has a low squat body, 4 inches in diameter and an elongated neck at the top of which the face is modeled. The face is complete except for the nose and one ear. The restoration of the nose must be questioned, but it is modeled on the lines of known examples of Gila Polychrome. That it was relatively larger than in most representations is shown by the area of breakage. The eyes are small elongated clay pellets stuck to the base, each depressed centrally and painted black, as was done in Chihuahua jars whenever a similar type of eye was employed. A shallow slit forms the mouth. Its borders are not elevated nor was it painted. The chin protrudes goatee-fashion—a treatment commonly noted on Chihuahua jars—and is painted with short vertical alternating lines in black and red on a white background, prob-

ably representing tattooing. The ears are prominent crescent-shaped projections, and the original right ear is pierced at the lobe by a tiny hole. Modern Pima effigy jars are sometimes seen with pierced ears from which a few beads may be suspended. Chihuahua examples, also, occasionally show this treatment. On the back there is a white patch which bears alternate black and red lines, undoubtedly an attempt to represent hair.

The face sherd (pl. 13, *f*) consists of the left portion showing the nose, eye, and ear. The nose is small for the size of the face and strongly convex or beak-like. The orbit was formed by an oval mound deeply slit horizontally, the lower border of which is painted black. The eye mound is not differentiated strongly from the base as was the case in the previous example. A slight elevation marks the cheek and the ear is of the usual crescent ridge type, but not pierced.

It has already been noted that effigy vessels were known to the Hohokam as early as the Sweetwater Phase and that they were used only occasionally then or at any time thereafter. With the advent of the Salado into the Gila Basin the trait seems to have become somewhat more abundant and the forms are consequently in polychrome. Contemporaneous with these was the great emphasis on effigy forms in Chihuahua. The detailed similarities in the effigies of the two areas obviously mean relationship and, because they were much more strongly developed in the south, it may be assumed that the effigy complex of the Salado was but an attenuated form.

Certain regional differences may be noted. The Salado people made more bird and few human effigies relatively than was the custom in Chihuahua and what human types were made seldom showed any relief modeling of arms and legs or other anatomical features. And most conspicuous of all is the lack of the hood type of effigy in the Gila-Salt area. On the whole in Chihuahua there was a much greater fidelity of modeling, whatever the subject.

Another question which can properly be taken up at this point, concerns the origin of bird effigies in red ware (p. 100). These apparently had a different source than the poly-

¹⁴⁰ Kidder, 1916, p. 258.

¹⁴¹ Kidder, 1916, pl. 11, nos. 7 and 9.

chrome types. As previously pointed out, the red ware vessels, normally supplied with handles, are shaped like the body of the bird, tail and wings often being modeled, but the head is missing since this area is taken up by the mouth of the jar. This type seems to have been unknown in Chihuahua, but it occurred frequently in the Pueblo region northeast of the Gila, even in early times when pottery-making in the San Juan was just getting underway.¹⁴² Later examples in black-on-white from the Little Colorado drainage are not uncommon and the area of distribution is continuous to the Gila drainage. There are grounds for assuming, then, that the effigies in Gila Red are morphologically related to those farther north. On the other hand, the polychrome type, with head and tail attached to an otherwise normal jar, although the shaping of the body is sometimes seen, is practically confined in distribution to the Gila and south.¹⁴³ Apparently, there was a convergence in the Gila of the two bird effigy types.

DECORATION

Gila and Tonto Polychromes are extremely difficult to analyze from the standpoint of decoration. To carry such a study through successfully would necessitate a close examination of a large number of polychrome vessels — far more than the seventy-odd examples available from Los Muertos and Las Acequias combined. Furthermore, a collection for a thorough analytical study of design should sample all parts of the polychrome territory in order to bring out pattern trends and concentrations. By way of speculation, the seat of the difficulty seems to be confined to two facts, the first being the cause of the second: (a) the contact with the Hohokam afforded an opportunity to derive new elements from a different decorative complex; and (b) a consequent alteration of the artistic tradition. The departure from the old tradition evidenced in Pinto Polychrome is seen best in the unrestrained character of the designs, particularly in Tonto Polychrome.

It has been shown that Pinto Polychrome borrowed liberally in its design from the

painted red wares in the Little Colorado drainage.¹⁴⁴ The characteristic bowl decoration — bowls constituting at this stage practically the sole category of shapes — was to leave an unpainted area in the center, square or round, and not to frame the field of decoration at the rim. Occasionally decoration was in an all-over style. Outside decoration was lacking as a rule. Designs consisted in the majority of cases of rectilinear, geometric figures, with occasional curvilinear figures, notably the scroll; brushwork was precise. Later on, these more or less fixed rules were waived in favor of all-over patterns, the breaking up of the decorative field into primary and secondary zones, an elaboration in decorative motives, a three-color treatment, and a prevalent use of outside decoration. Coupled with these changes was a degeneracy of brushwork.

A few general observations can be made before continuing with the more detailed account of Gila and Tonto Polychromes. The blocking out of the pattern in some instances shows a decided lack of care. This is in keeping with the inferior character of the brushwork. Pains were not expended to make line meet line in a neat junction, to conceal overlaps, or to keep the width of a line unwavering. There is a great use of heavy solid lines and large solid or nearly solid geometric areas. The designs on bowl exteriors, particularly on the larger examples in which the red, white, and black have been integrated, impress one as being bold and vigorous. No adequate analogy can be drawn from any Southwestern ware. The art is dominantly rectilinear and geometric. Curvilinear figures occur in about fifteen per cent of the specimens at hand.

As an aid to the understanding of the sequent steps followed by the polychrome potters in applying a three-color pattern to a vessel, figure 41 has been prepared. The initial drawing, *a*, represents a small brownish-colored jar which has been dried and smoothed, probably by hand, and is ready for ornamentation. White was first taken up and applied to a zone about the neck, then to a second broader band about the body, *b*, leaving a circular area unslipped. The white areas were then pebble polished.

¹⁴² Morris, 1927, pp. 169, 180; fig. 16, *a*, *c*, *d*, and *e*.

¹⁴³ One known exception is a jar figured by Roberts from southwestern Colorado (1930, fig. 19, *f*, p. 102).

¹⁴⁴ Gladwin, W. and H. S., 1930c, p. 5, pls. III and IV; Hawley, 1930b, p. 532.

It is evident that the artist was preparing for a pre-meditated pattern. The next step, *c*, consisted of working out the pattern in black. The heavy framing lines on the body zone were set in a short distance from the outermost edges of the white field, a trait which was practically universal. A wavy line encompassed the circular area, a part of it extending over onto the untreated surface. In the final move, *d*, the red slip was applied to the bottom, to the area within the white band, to the horizontal zone separating the neck from the body band, and lastly, to the rim edge and a short space down on the inside of the neck. With the polishing of these reddened parts, the vessel was ready for the firing. In the circular field, the red covered up those parts of the wavy black line that extended beyond the white and produced a serrated edge to the red circle. The use of red, brush-applied paint on the white background would complete the whole list of combinations as shown in the Los Muertos specimens.

Bowls: INTERIORS: Gila Polychrome bowls have the whole of the concave inner surface slipped white, designed to carry the black decoration. The styles of interior ornamentation may be grouped in a broad way into four types, the distinction being based on the treatment of the side wall immediately below the rim and the use of a new color: (1) decoration to the rim; (2) a solid band at the rim; (3) a band pattern at the rim; and (4) the introduction of red fields into the white.

TYPE 1: This is an all-over pattern which reaches the rim, but is not carried over the edge (fig. 42, *a*). It is seen in a high proportion in the older Pinto Polychrome bowls and appears to be an early trait which survived only occasionally into later times.

TYPE 2: In this type there is a solid band at the rim, the "life line," usually broken at one point for the "spirit escape" (fig. 42, *b*). The average width of this band is $\frac{1}{2}$ inch. Next downwards, or into the bowl, follows a narrow unpainted zone, usually slightly wider than the solid rim band. Then comes the framing line of the circular and primary field of decoration which covers the remainder of the interior surface. This framing line is always narrower than the "life line" rim band.

TYPE 3: Here the whole inner surface is divided into a primary or central field, and a secondary or marginal zone below the rim, the two being separated by the "life line" (fig. 42, *c*). The central zone is circular and the rim zone is a band pattern, usually framed from the lower side only. This zone ranges from $\frac{3}{4}$ to

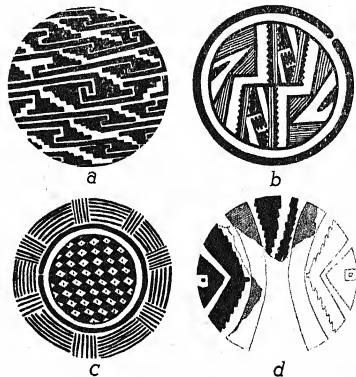


FIG. 42. Types of ornamentation in Gila (*a-c*) and Tonto (*d*) Polychromes.

$1\frac{1}{2}$ inches in width and is filled with geometric figures, hence the name band pattern.

There is a direct correlation between bowl shape and the three types of decoration just described. Type 1, or decoration to the rim, occurs predominantly in outcurved bowls; Type 2, a solid "life line" at the rim is linked with hemispherical bowls; and Type 3, a band pattern at the rim, is found almost exclusively in recurved bowls. The table given below, compiled from complete and fragmentary vessels found in Los Muertos, provides a satisfactory basis for the above statements.

BOWL SHAPE	DECORATION			Total	Per cent for dominant
	Type 1	Type 2	Type 3		
Outcurved	17	2	1	20	85.
Hemispherical	6	95	3	104	91.
Recurved	1	0	63	64	98.

It was probably not purely a matter of choice that one of the specific types of decoration was persistently put on a particular shape of bowl. The figures seem also to express the

existence of a mechanical relationship between the character of the surface and the form of the decoration. On outcurved bowls it was a simple matter to let the design trail off and cease at the rim; in recurved bowls, the increased surface area, due to the heightening of the rim and the recurving of the same, presented an altogether different surface not well adapted to an all-over, unbounded design. The hemispherical bowls form an intermediate group in which the moderate increase of surface over the shallow bowls was taken care of by the broad band just below the rim. This seems to be a particularly clear case where vessel shape was, to a considerable extent, a controlling factor in the zoning of the field of decoration.

TYPE 4: A fourth type of dividing the interiors of bowls was accomplished by introducing red fields. This occurred only in Tonto Polychrome, and there is but one fragmentary bowl from Los Muertos from which this can be reconstructed (fig. 42, *d*). The example shown has a central black-on-white band flanked by red stripes on either side and finally a pair of semi-lunar white areas showing black design. A red circular area in the bottom of the bowl is noted in some sherds. There is no apparent correlation in the few fragments at hand between the use of red on interiors and bowl shapes.

ZONING: Coming now to the specific treatment of the primary and secondary zones of bowl interiors, we find that it is next to impossible to seriate them in a significant form. The best that can be done is to note the variations in order to make clear the elaboration and free play of elements during the later part of the polychrome period.

Primary Area: As previously noted, this zone is circular, occupying the inner part of the bowl and is bounded by a framing line, except in the case of shallow bowls where the design is carried to the rim. The subdivision of this central area assumes a number of varied forms. In the thirty-one bowls available for study from Los Muertos no less than eight major modifications and numerous variations have been noted.

In eleven examples the treatment is one in which the field has been divided into halves as it were, each half bearing the same design but in inverse relation to produce what Kidder has called a "dual balanced design"¹⁴⁵ (fig. 42, *b*; fig. 43, *a* and *b*). While suggestions of this form are to be seen in Pinto Polychrome, it



FIG. 43. Los Muertos. Styles of treatment of the primary field in Gila Polychrome bowls.

reached its greatest degree of multiplicity in Gila Polychrome. This form of design seems to have been a favorite one throughout the polychrome region and is the commonest in the bowls of the Los Muertos Collection.

The central field in five cases bears a checkerboard design (figs. 42, *c*; 43, *c*). The alternate white squares may be with or without central dots, and in one instance the squares have been transformed into rhomboidal figures, each of which contains several dots.

¹⁴⁵ Kidder, 1924, p. 110.

Terraced elements arranged free within the zone are present in three bowls (fig. 43, *d*). Single figures usually occur along the margin of the zone while the inner ones are either opposed or joined to form a composite terrace.

Again, in three specimens the pattern is purely linear (pl. 10, *c*), extending across the field mainly in one diameter. The continuity



FIG. 44. Los Muertos. Styles of treatment of the primary field in Gila Polychrome bowls.

of a line may be broken by an off-set and terraced elements are also introduced (fig. 42, *a*). In the Los Muertos Collection, this type of decoration seems to be confined to shallow bowls.

There are two instances where the field was divided into quadrants or two duplicate pairs of sectors opposing each other (fig. 43, *e* and *f*). The apices of one pair usually touch at the center.

A use of concentric bands of elements (fig. 44, *a*) is noted in only one case. The bowl is decidedly infantile in character.

In two examples each there are inner unpainted square and circular areas (fig. 44, *b* and *d*). The square area is most frequently produced by the use of four symmetrical sectors which do not meet in the center. This

quadrate treatment is very prominent in other Southwestern wares, particularly those from the Kayenta district, the Little Colorado drainage, and the black-on-white in the Tonto Basin.¹⁴⁶ The inner square and the circle are

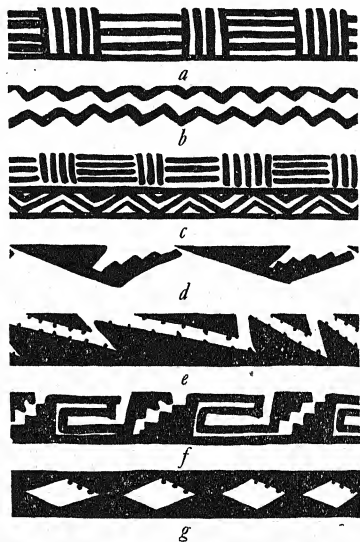


FIG. 45. Los Muertos. Band patterns on recurved bowl interiors.

also dominant in Pinto Polychrome which undoubtedly passed these features on to the later vessels, although the usage seems to have lost ground, giving way to all-over patterns. A variant form is shown in figure 44, *c*, in which the inner square has been filled with an interlocked key.

There is one instance of a three-fold division of the field by longitudinally hachured panels (pl. 10, *a*).

Secondary Area: This takes the shape of a horizontal band located immediately below the rim. It is found almost exclusively in bowls

¹⁴⁶ Roosevelt Black-on-white; Gladwin, H. S. and W., 1931, pl. XLII, *b*.

with recurved rims. Decoration begins at the rim's edge, normally without a framing band, and extends downward to but never touches the life line. The lower border in the majority of cases is framed. Elementary linear band patterns (fig. 45, *a-c*) were popular as were also solid elements, such as terraced figures, triangles, and keys (fig. 45, *d-f*). Occasionally a negative band was used as in figure 45, *g*, in which lozenge-shaped areas are formed by the white background. These band patterns are almost universally rectilinear.

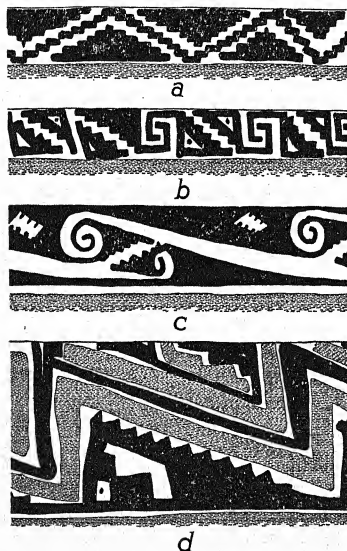


FIG. 46. Los Muertos. Outside bowl decoration on Gila (*a-c*) and Tonto (*d*) Polychromes.

EXTERIORS: Whether or not outside decoration occurs on bowls seems to depend partly upon how much of the outer surface is presented to view. For instance, the exterior of an outcurved bowl is not very conspicuous, hence there was little use of applying decoration. Recurved bowls, on the other hand, presented high sides and outside ornamentation could be, and was, advantageously employed.

Outside decoration, however, is universal only on the incurved bowls. The following figures show the gradual increase in frequency of outside decoration in ratio to the constriction of the sides.

BOWL SHAPE	NUMBER OF EXAMPLES		Per cent showing outside decoration
	Without decoration	With decoration	
Outcurved	20	5	25
Hemispherical	104	28	26
Recurved	64	27	42
Incurved	0	6	100

When present, the outer band of decoration extended more than half way down the side of the bowl. It reached its greatest width in the recurved bowls on which it was sometimes carried well towards the bottom so that no undecorated parts were visible. Decoration

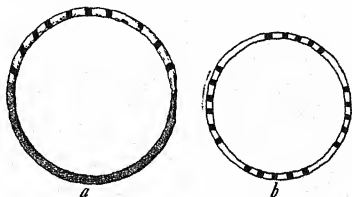


FIG. 47. Los Muertos. Rim decorations on Gila Polychrome. Diameter of *a*, 5½ inches.

normally begins at the rim where a containing line is absent. Two-color bands, i.e., black-on-white, predominate on the smaller vessels. Typical examples, two rectilinear and one curvilinear, are reproduced in figure 46, *a-c*. Three-color bands, including black, white, and red, are found chiefly on the large recurved bowls where greater breadth of space was offered (fig. 46, *d*). It was particularly in the latter that a boldness of decorative technique asserted itself most strongly.

RIM DECORATION: The rims were habitually slipped red. Two hemispherical bowls in the Los Muertos Collection are exceptions to this general custom, in that their rims have been partially or wholly ornamented. In each case, the rim was squared. On the first example (fig. 47, *a*) less than one-half the rim was painted white which served as the base for "ticks" in black. The second bowl (fig. 47, *b*), shows an all-over white decoration on which

the "ticking" has been arranged in four groups. On both of the Los Muertos examples, rim ornament is associated with outside decoration, although on the specimen from Las Acequias the exterior is unornamented. Among the rim sherds there are three instances with rim and exterior decoration and two cases of rim painting on incurved bowls, also with outside patterns. It would seem therefore that rim decoration tends to be more commonly allied with exterior ornamentation and the more incurving types of bowls.

The "ticking" of rims is one of the noticeable features of the Mesa Verde bowls, but the custom is also found in the Salado area on Roosevelt Black-on-white,¹⁴⁷ a component of the Salado Culture and contemporary with Pinto Polychrome, hence earlier than the pottery which is being dealt with here. It is evident from the habit of grouping the rim dots on Roosevelt Black-on-white that it gave rise to the rim decoration on Gila Polychrome.

THE LIFE LINE: The heavy broken line called by Cushing the "exit trail of life,"¹⁴⁸ which is such a prominent feature in Gila Polychrome, occurs both on bowls and jars alike. The band is not ever present nor is it always broken, but it is, nevertheless, one of the outstanding traits of the decorative complex. Jars sometimes exhibit two life lines.

The full significance and history of the life line has not been determined. It is a simple, yet an individualistic thing, whose use may have depended on notions and beliefs, or it may have been purely a fad. Its origin undoubtedly goes back to fairly early horizons in Pueblo pottery but it is characteristically a late feature. However, it does not occur consistently on all late types, as for example, Four-mile Polychrome.¹⁴⁹ In spite of the fact that the focal area of Four-mile Polychrome was located between the old Hopi area on the north and the Gila on the south and west, regions in which the life line was dominant, and with which the makers of Four-mile Polychrome were in contact, it almost never shows the use of the broken line.

Jars: In both large and small jars, the decoration extends from the rim to well below the

greatest width. In examples of Gila Polychrome, the background is solid white, serving as the basis for the black patterns. The bottom is always slipped red. Tonto Polychrome brings red into use in the major white field but it never acts as a base color for either white or black alone.

The decoration may consist solely of a single broad horizontal band covering both body and neck (pl. 11, *c*). This is seen mostly on small jars. More often there is a band at the neck which is separated from the principal body band by the life line (pl. 11, *b*). The body zone is normally set apart from the rest by a pair of heavy black lines between which the design proper is further confined by a pair of narrower framers.

There are two instances of free field decoration. That is to say, that the patterns are not confined either on the upper or on the lower edges of the painted area by framing lines. In both cases the motive is the running "bird wing" in black (pl. 12, *b*).

In plate 12, *a*, a single narrow horizontal band in red segregates the body and neck fields, while *d* shows two horizontal red bands plus the use of red to set off the large key elements in the chief field of decoration on the body. If the jars are arranged typologically, there is evident a gradual increase of the use of red in the pattern. This undoubtedly has a temporal significance, as there are good grounds for assuming that Tonto Polychrome was a later development than Gila Polychrome. As in the case of bowls, when red enters into the composition of the design, the patterns become very bold and vigorous.

The neck and body zones are ordinarily treated as units with continuous devices. Panel division is rare.

On effigy jars there is a direct effort to emphasize the natural endowments of the subjects portrayed. Thus the black mandible of the parrot, the color of the plumage, the representation of wings in painted designs, the hair, and what probably is tattooing came into being.

We have seen that Tonto Polychrome embodies the use of red with the other colors in

¹⁴⁷ Gladwin, W. and H. S., 1931, pp. 47-49; pl. XLII.

¹⁴⁸ Cushing, 1886, pp. 510-512.

¹⁴⁹ Gladwin, W. and H. S., 1931, pp. 43-45.

the same decorative area, but the red is applied in the majority of cases to the base clay and does not serve as a foundation for other colors. There are two vessels in the collection and sherds from others in which a red paint was applied on the white along with the black in fine lined patterns. Hence, in the effigy jar (pl. 11, *a*, *a'*) there may be seen all of these styles in combination. The white bands carry patterns in black and red, which are separated from each other by the red used in the capacity of a slip. Although there is at present no stratigraphic proof to support the statement that this subtype of Tonto Polychrome was the last form to evolve in the complex, it may nevertheless be regarded as such on typological grounds of ornamentation.

Elements of Design: As is pointed out later, the polychrome tradition expressed in Gila and Tonto Polychrome is of a composite nature, apparently growing out of a union of several lines of influence. On this account the following attempt to disentangle some of the various elements will probably err on the side of over-simplification.

LINES: These are almost inescapable in whatever type of polychrome vessel that may be examined. There is only one case where a pattern of small solid elements has been used to the entire exclusion of any linear components. Three grades of lines on the basis of width may be noted: (a) the basic heavy bands forming the life lines or framers for broad zones; (b) the intermediate lines which serve to define the units of decoration; and (c) the fine filling lines found mainly as hachure, from two to three times narrower than their borders. Hachured triangles and long rectangular panels are very common occurrences, forming one of the strongest links with Pinto Polychrome and the northeastern Little Colorado area. It is noteworthy that where a series of triangles or other irregular areas are treated with hachure, the lines change direction frequently as in some of the late Little Colorado wares. Cross-hachuring is rare, but there is one outstanding example, the neck of the large jar in plate 12, *e*. Stepped lines are common, while wavy lines are comparatively rare.

DOTS: A great use was made of dots to fill small negative triangles and squares in larger solid areas. Usually there is but one, although more may occur, depending upon the size of the area to be filled. Dots appended to solid figures (fig. 45, *e* and *g*), more rarely to lines, may also be mentioned. Like the rest of the brushwork, dots were carelessly made.

SERRATIONS: Serrating is one of the most outstanding and ever present features of polychrome decoration. Whether only a line or a greater geometric area, the edges are serrated by means of adding small black triangles. But the more common method of producing the serrations was by making a squiggly line, drawn along the edge, of which one-half projected out onto the white field. The rendition of this line is usually irregular. This process is clearly shown in figure 41, *c* and *d*. Whether serrations of this form are degenerated from a dotting technique or are something quite different is difficult to say. The dotting of borders is seen in Pinto Polychrome; but rarely, if ever, do serrations occur. Both the dotting and serrating of borders is seen in comparatively early red-on-buff, so that the custom, the latter particularly, may have been acquired from the Hohokam.

SMALL ELEMENTS: There is no suggestion whatever of the use of repeated or individual small elements, other than the dot.

TRIANGLES: These are an essential part of polychrome decoration and it is only necessary to review some of the patterns illustrated herein, to show that a cataloging of the various usages would be long and tedious. Triangular fields were either filled with hachure, or perhaps more often still, painted solid black save for a small negative circle, square, or triangle. There is some fairly reliable evidence to indicate that the latter was borrowed from the red-on-buff. The common form of presentation in the red-on-buff was either a small solid triangle (fig. 48, *a*), or, one with a dotted or otherwise center usually having a single serrated edge (fig. 48, *b*). The triangle with open center appears in Gila Polychrome and seems to become progressively larger as its use spreads with consequent modifications. In figure 48, *c* the inner circle has been increased in diameter in proportion to the triangle and filled with

short parallel lines. In *d* red has been introduced into the heart of the circle plus two small negative squares in the upper corners. Serrated edges have not only been preserved but extended to both sides of the triangle (*e*).

KEYS: The outstanding use of the key in Gila and Tonto Polychromes is in its size, in the addition of other elements, and the breaking up of the solid area with small negative patterns (fig. 48, *j*; pl. 12, *d*). Compounded in this way, the key sometimes covers a large proportion of the field of decoration. Keys

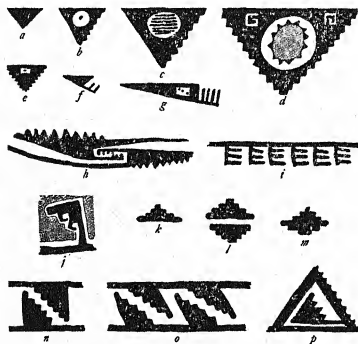


FIG. 48. Los Muertos. Elements of decoration occurring in Gila Polychrome.

were also used in simpler form, as fillers or terraces in bands where they have been added to the framing lines without the use of stems (fig. 48, *n*, *o*) and within geometric units of decoration (*p*). The opposed keys attached to stems, seen as typical devices in Chihuahua pottery and in some forms of black-on-white, are of infrequent occurrence.

Related to keys are elements as shown in figure 48, *f-i*. The simplest form consists of an L-shaped figure extended from the apex of a solid triangle, although two pendant lines from the bar is a standard way of rendition. Sometimes figures of this sort are opposed, the extensions interlocking. Jar *d*, plate 12, illustrates a number of variations appearing on a single vessel.

¹⁵⁰ Kidder and Guernsey, 1919, pp. 137-138.

TERRACED ELEMENTS: These were widely used, either independently or in combination with other motives. Some of the more simple forms are given in figure 48, *k* to *o*.

SCROLLS: Both single (fig. 46, *c*) and interlocked types (pl. 12, *a*) occur. An approach to the balanced solid and hachured scrolls of Pinto Polychrome and St. Johns Polychrome is seen only in one case (fig. 43, *a*). The normal mode of presentation is by simple curved lines projected from triangles.

"BIRD WING": The motive so named is "a current design with recurved toothed projections"¹⁵⁰ which is found with remarkable frequency and uniformity on both early and late Kayenta Black-on-red. In Gila Polychrome, it is often represented on bird jars (pl. 11, *e*) and arranged so that the toothed parts fall where the wings would normally be, hence the name. The motive is by no means confined to bird jars, however, as it is found on bowls and jars alike. The usual presentation is seen in figure 49, *a* (also pl. 12, *b*) in which the band is nearly solid black. The "bird wing" was sometimes also used individually, as in figure 49, *b* and plate 12, *c*. In the latter it has become so greatly magnified that a mass of other motives have been woven into it. There are no examples of rectilinear treatment of this motive at this site.

What may be regarded as an allied form is a spiral with either toothed or terraced appendages (fig. 49, *c*, *d*, and *e*). Striking analogies of these may be seen on certain Pinedale Polychrome bowls,¹⁵¹ dating roughly in the neighborhood of A. D. 1300. Figure 49, *f* is taken from the back of a bird jar which was brought in by the Hemenway Expedition, but the data pertaining to its provenience have been lost. That the toothed figure, in the various modifications that are shown, is related to or was intended to portray parts of birds—perhaps feathers—seems to be further suggested by the case just mentioned.

LIFE FORMS: Naturalistic or recognizable conventionalized human, animal, or plant figures are entirely lacking in the Los Muertos Collection of polychrome.

¹⁵¹ Haury and Hargrave, 1931, pp. 67-68.

DISCUSSION

This brings us now to the interesting question as to whether or not there was hybridization of design elements in Gila and Tonto Polychrome with other styles. At the present stage, we can do but little more than speculate as to the possible influences represented. The

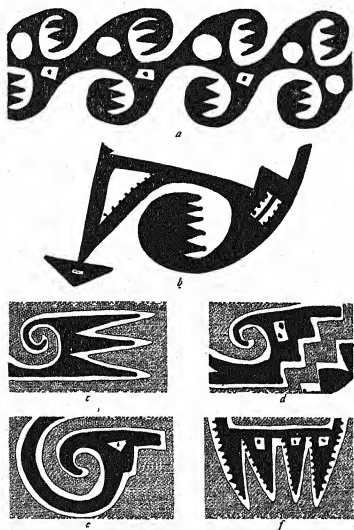


FIG. 49. Los Muertos. The "bird-wing" pattern and probable related forms.

prototype, Pinto Polychrome, undoubtedly contributed the basic elements, such as, opposed solid and hachured figures, the use of hachure as a filling medium in triangular and other geometrical areas, unpainted central squares and circles, and broad solid lines. The "dual balanced design" seems already to have begun in the Pinto stage and is also evident in other contemporary wares in the Little Colorado, so that, no doubt, it was also an inherited

feature destined to be elaborated in the later stages. Terraced figures and perhaps the use of dots along borders was also passed on to Gila Polychrome.

The westward expansion of the makers of polychrome brought them into intimate contact with the red-on-buff potters of the Hohokam. It is almost impossible to imagine that two people could live side by side in the same village without some consequent borrowing. This would come out most strongly, perhaps, in pottery. It would be difficult to determine any possible transference of design if polychrome and red-on-buff had evolved synchronously. But, as the red-on-buff complex is definitely the older, and polychrome was an alien ware to the area, any borrowings should be recognizable. The persistent use of negative squares, circles, and triangles dotted in the centers, seems surely to have been acquired from the Hohokam where it was well established by the Sedentary Period.¹⁵² Elaboration of this device eventually led to such patterns as illustrated in figure 48, *d*. The serrating of borders undoubtedly also came from red-on-buff. Scrolls and keys are difficult to attribute to any one source. The former were much used in Santa Cruz and Sacaton Red-on-buff and comparatively little used in Pinto Polychrome. As the scroll had all but died out in Casa Grande Red-on-buff, it may be inferred that Gila Polychrome inherited it from its earlier relative. The textile-like lay-out of jar patterns in Casa Grande Red-on-buff were not carried over into polychrome.

The "bird wing" pattern is of unusual interest because it is almost identical in form with the decoration frequently seen on Dogoszhi Polychrome.¹⁵³ This similarity presupposes relationship, at least a common origin for both forms, although the connections are not easily established.

To Chihuahua we must turn for the inspiration of effigy jars, but the painted decoration of Chihuahua is not strongly reflected in polychrome types.¹⁵⁴

The body of the evidence, if it does not con-

jar from the north must be admitted as a possibility; but there are yet no facts which warrant such a conclusion.

¹⁵² Gladwin, Haury, Sayles, and Gladwin, 1937, fig. 112.

¹⁵³ Hubert, 1940, pl. 10.

¹⁵⁴ That the Chihuahua Culture derived the effigy

vincingly point out sources for at least some of the polychrome elements, certainly supports the statement that the decorative make-up of Gila and Tonto Polychromes was of a composite nature. The polychrome potters were not rank copyists, as might be suspected in cases of borrowing, but they adopted elements here and there, and then adapted them to produce a style of ornamentation peculiarly their own. The outstanding achievements of their school was the unlimited variety in treating the fields of decoration, the emphasis upon large black elements, the "dual balanced design," the addition to the use of serrated edges, large complex keys, terraces, and finally the development of bold black, white, and red patterns during the late stage.

RED WARE

Pottery studies often over-emphasize the decorated wares at the expense of the unpainted wares. But plain pottery, whether slipped and polished or not, is quite as essential to the understanding of a culture's ceramic history as are the most spectacular of the painted types. The truth of this statement comes out strongly when one considers the fact that only twelve per cent of all vessels obtained at Los Muertos were decorated.

The red ware collection from Los Muertos is numerically large and is well represented by an ample series in nearly all shape categories. There are, in round numbers, about 500 vessels, complete or restorable. This can be regarded as a truly adequate sample of the red ware output of the village. Two-thirds of the total number of vessels were recovered in the cremation plots where they served either as containers for the incinerated bones or as accessory furnishings. Practically all of the large red jars were removed from these plots. Less than one hundred specimens were found with burials and these were almost universally the smaller types of bowls and jars. Between fifty and sixty red ware vessels were found in the rooms themselves, a surprisingly low figure considering the number of rooms excavated. This poverty of specimens in houses has, I believe, only one explanation, namely, that no

catastrophic event overtook the occupants of Los Muertos, as has been claimed (p. 210). Most of the household goods appear to have been carried away at the time of the evacuation.

The red ware from Los Muertos is a clear-cut class of pottery, readily distinguishable from the true plain ware in surface treatment and shapes. Classified as to function, red ware was undoubtedly culinary. It constituted the bulk of the household pottery, but it seems, nevertheless, to have served a restricted culinary purpose. The absence of fire stains on both jars and bowls would indicate that they were almost never used directly for cooking; and the tall-necked, small-mouthed jars, moreover, were not well adapted for cooking because of the difficulty of putting in and removing foodstuffs. Their small mouths did, however, make them ideal containers for the storage of water, maize, beans, etc., because they could easily be sealed. The true plain ware jars universally show large mouths and much soot from continued use over the kitchen hearth. It must be inferred that these fulfilled the primary culinary demands; that the red ware bowls served as receptacles for foods already cooked and sundry other uses; and that the chief purpose of the red ware jars was storage.

Gila Red and Gila Smudged; Salt Red and Salt Smudged

Recent detailed stratigraphic studies by Schroeder¹⁵⁵ in the Salt River Valley have at last given us some worthwhile data concerning the red ware development in the Classic Period. What was formerly all classed as Gila Red, which was sometimes smudged interiorly and sometimes not, has since been broken down into four closely related types but with a sound chronological and technological basis. All of these types may be dated to the Classic Period, two being diagnostic of the Soho Phase and two of the Civano Phase. The situation may be outlined as follows:

¹⁵⁵ Schroeder, 1940.

PHASE	TYPE	CHARACTERISTICS ¹²⁶
Civano	Salt Smudged:	Mica rare to absent; well polished but striations not apparent; carbon streak in core; slip pigment thick; fire clouds small; interiors smudged; break, shattering.
	Salt Red:	As above but vessel interiors not smudged.
Soho	Gila Smudged:	Mica abundant; polishing striations very apparent and often arranged in patterns (see pp. 84-86 herein); core colors red to tan; slip thin and sometimes not apparent; fire clouds large and irregular; interiors smudged; break, crumbling.
	Gila Red:	As above but vessel interiors not smudged.

It is clear from this that Salt Smudged and Salt Red are but refinements of Gila Smudged and Gila Red and that while they are phase diagnostics, during the transitional stage, they occurred together. Smudged vessels outnumber the unsmudged by a large ratio at all times.

In 1932 when the Los Muertos pottery of this class was examined, these finer distinctions had not been made, and all the pottery was grouped as Gila Red. Since the Hemenway material was not excavated with the same degree of precision as is expected in digs today, it is doubtful whether re-examination would add much to the picture. More than ninety per cent of the red ware from Los Muertos is of the Salt Smudged type, good evidence in itself that the Expedition was working in a Civano Phase ruin, and the following description pertains to Salt Smudged, unless otherwise specified. The origin of Gila and Salt Reds and the Smudged variants must be linked with the early development of polished red and smudged types in the Mogollon Culture of the Mogollon Rim area.¹²⁷

TECHNOLOGY

The red ware from Los Muertos is interesting technologically because it shows ornamentation in media which were not so commonly

used in other parts of the Southwest with the exception of the first listed: (a) smudging of interiors; (b) intentional fire clouds; and (c) pebble polishing, carried to such a high degree that patterns often resulted (in Gila Red). But before discussing these a few general observations should be made.

The red ware of all types in the Salt area was made by the coil paddle-and-anvil method. Some of the vessels clearly show the paddle facets on the exteriors. The typical bowl, however, has well-smoothed interiors and exteriors, apparently done with the hand and not a scraping spoon.

Jar interiors show less strongly the anvil marks than do those of red-on-buff ware. This is due in great measure to the fact that a certain amount of modification by way of smoothing was usually extended to the inner surfaces, particularly in the jars with large mouths.

One accessory used in the process of manufacture is known from circumstantial evidence. This was a shallow bowl or basket serving as a support for the growing vessel. It is entirely probable that this device was also used as a sort of revolving base to bring all parts of the jar to the hands of the potter, as employed by many pottery-making people. About fifty per cent of the forty-odd large jars carry this basal mold impression. It varies from the faintest trace to impressions strongly accentuated by an outward expansion of the vessel walls over the rim of the mold (fig. 57, *b-i*). Excepting one case, the mold impression is not seen on the smaller jars and pitchers.

It is doubtful whether a special type of bowl was constructed to fulfill this particular function of supporting a growing jar. There are shallow bowls from Los Muertos which could have served that purpose, but they differ in no way from the normal bowl. The use of baskets in this capacity is shown by faint and almost wholly obliterated coil impressions on the base of a single jar.

The method of construction can be put as follows: First, the shallow basal mold was lined with a layer of clay, later to form the bottom of the jar. The sides of this were carried an

¹²⁶ Schroeder, 1940, pp. 113, 183-186.

¹²⁷ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 265; Haury, 1940, pp. 89-90.

to view the large jar figured in plate 14, *a* and *a'* to realize that an orderly arrangement of the clouds was attempted in order to achieve a decorative effect however difficult it was to control them. The base of the specimen is scorched from the hot embers on which it rested, but the real and only other clouds appear on the upper body immediately above the shoulder. Their shape is roughly oval being somewhat more pointed at the upper ends. The black central portions are bordered with a yellowish corona, as it were, beyond which the color gradually becomes the dominant rich red. This is a characteristic feature of the red ware fire clouds. It would seem that sticks were laid up against the jar like the spokes of a wheel. While burning these would deposit carbon at the points of contact but the oxidizing flame at the edges of the glowing embers would prevent carbon from being deposited and produce the coronal effect that is seen.

Polishing: The third and perhaps more interesting treatment of the red ware from Los Muertos was the polishing of the surfaces with stone pebbles. As previously pointed out, pebble polishing was carried to such a high degree in Salt Smudged that the actual directions of the polishing strokes are difficult, if not impossible, to determine. But in Gila Smudged, the earlier form, the potters were not so much bent on producing a completely smoothed surface as they were on meticulously arranging the polishing striations to form patterns. Although Gila Smudged from Los Muertos is numerically (less than ten per cent) not strongly represented, it nevertheless demonstrates an unusual range of polishing patterns.

The width of the polishing marks is variable between $\frac{1}{32}$ and $\frac{1}{8}$ of an inch. In the average specimen they do not display any appreciable relief, even though the striae are plain. In a few vessels, the edges of the shallow trough-like marks attain sufficient relief to be perceptible to the touch. The marks usually impinge upon each other and the greater degree to which this was carried out and the more times the stone was passed over the same surface, the more obscure became the striations.

It is clear in many cases that each stroke had a more or less predetermined starting and ending point. This gave rise at once to their systematic arrangement. Through the shifting of the terminal points and the change in direction of the stroke within given areas, patterns were produced which unquestionably were regarded as having decorative value. Two methods of arrangement in bowls have already been noted.¹⁶⁶ These are: (a) the convergence of the striations at opposing points at the rim "as in a globe cut in half through the poles" (fig. 51, *a*) and (b) the striations meet at a central point "as in a globe cut in half at the equator" (fig. 51, *f*). Additional forms noted on the red ware from Los Muertos are as follows: the dropping of the points of convergence below the rim and the continuation of the marks between these points and the rim in a direction parallel with the rim (fig. 51, *b*); the junction of the striations is formed along a diameter rather than at two points (fig. 51, *c*), and a modification of the same by making a small central circular field in which the marks trend at right angles to the line of meeting (fig. 51, *d*); a pattern in which the strokes are long and blended into each other, converging in a concentric manner on a central point (fig. 51, *e*); the subdivision of the whole field into four sectors, the strokes being parallel to the rim (fig. 51, *f*); the reduction of two of these sectors to polar fields which were irregularly or neatly defined (fig. 51, *g, h*); a further step was to segment the total field and to polish these areas with strokes trending at right angles to those in the main field (fig. 51, *i*); when the point of convergence was in the center, by creating a band at the rim (fig. 51, *k*) and by further introducing a small circular area in the center (fig. 51, *l*). Ordinarily, the same pattern was applied to the exterior and interior of the bowl, although this was not necessarily the case. When the points of convergence are at the rim, the axis of the exterior arrangement was sometimes shifted a quarter of a turn so as to bring its axis at right angles to the inner pattern. The small inner fields as in *d* and *l* are usually found on bowls with flat bottoms and steeply rising sides. The polishing systems

¹⁶⁶ Gladwin, W. and H. S., 1930c, p. 13, pl. X.

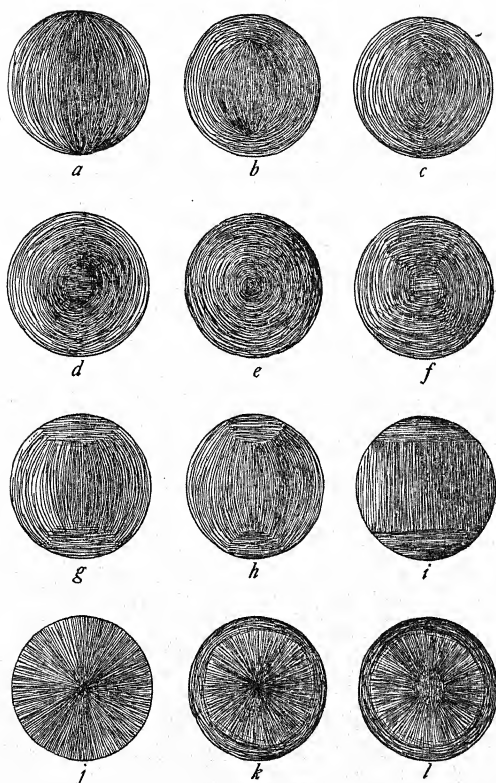


FIG. 51. Los Muertos. Various types of patterns produced by the polishing striations on Gila Smudged bowls.

seen most frequently are figure 51, *a, c, g, h, i, and k*. An indiscriminate and careless use of the polishing stone is also of common occurrence.

This same sort of specialization was carried to other small vessels as pitchers, jars, mugs, and vases. Generally, the striations extend vertically—from the rim towards the bottom (fig. 52, *a*)—but there was no consistent method. Examples *b* to *e* will suffice to show some of the variations. Large jars show the polishing elaborations to a lesser degree. The striations trend either horizontally or vertically.

In a few cases means of decoration were resorted to, not previously included in the discussion. Two painted red ware vessels, described later (pp. 100–101), are found in the Los Muertos Collection. True incising does not occur on any of the vessels of the current lot, but a jar sherd shows a treatment related to incising. This consists of short vertical lines, the impressions of a sharp-edged tool pressed

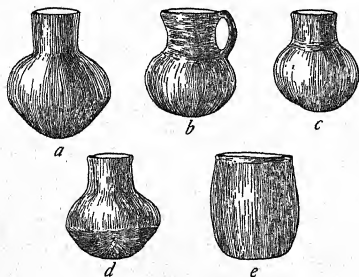


FIG. 52. Los Muertos. Polishing patterns on small jars, pitchers, and beakers of Gila Smudged.

against the clay while wet (fig. 53, *a*). Also there is but one sherd in this class of pottery evidencing plastic ornamentation. It is part of a handled vessel of undetermined shape of which the exterior surface was covered with conical protuberances of clay (fig. 53, *b* and *b'*).

Effects of Secondary Firing: A large proportion of the red ware vessels passed

through a secondary firing, ascribable to the practice of burning the mortuary offerings with the body at the time of cremation. So much more intense was the pyral fire than the original fire that several noteworthy effects

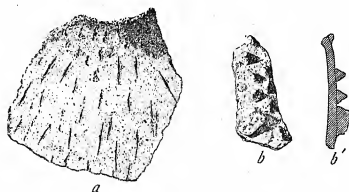


FIG. 53. Los Muertos. Salt Red sherds impressed with edge of sharp tool (*a*), sherd showing plastic ornament (*b, b'*). Width of *a*, $4\frac{1}{2}$ inches.

were produced. First of all, the red ware has lost its lustre and rich red color. This was replaced in most cases by a lifeless gray color. The black burnished carbon interiors were burned out, partially or completely, leaving a tawny colored surface. Internally, the clay lost its red and black colors, being burned to a fairly uniform gray, and the paste was also hardened. Surfaces were often roughened by vitrifying and blistering. So excessive was the heat in some cases that the vessels literally melted and were distorted far from their original shape. This was naturally accompanied by the development of many cracks.

VESSEL FORMS

A greater number of shapes is evident in Gila and Salt Smudged¹⁰⁷ than in any of the contemporary Gila-Salt wares, although Gila and Tonto Polychromes are not far behind. Bowls and jars were the outstanding forms. These were the essential types during earlier periods in pure red-on-buff sites, and the present forms, to a marked degree, preserve the ancestral patterns. The scoop shape is likewise deeply rooted in the past, but pitchers, mugs, and bird effigies appear only, as far as the evidence goes, during the Classic Period and their presence may be due to importation rather than to local invention.

form between Gila and Salt Smudged.

¹⁰⁷ There are no observable significant differences in

Red ware vessels are distributed in the various shape categories as follows:¹⁶⁸

Bowls	276
Jars	117
Pitchers	21
Scoops	54
Beakers	9
Mugs	5
Cups	1
Bird effigies	9
Incurved vessels	1
Tripod vessels	1
Painted red ware	2
Total	496

Bowls: The bowl seems to have been the commonest container in the Los Muertos household, as it outranks the jar by a ratio of more than two to one. The standard form was the outcurved bowl in contrast with the hemispherical type dominant in Gila Polychrome. The low-sided, broad, incurving, Pueblo IV type of bowl, which was so prevalent in the Little Colorado and in the Rio Grande, is conspicuously lacking. Rim treatments throughout all shape categories are not distinctive and for that reason are unimportant classificatory criteria. In grouping the bowls, major consideration has been given to the contour as seen in vertical profile, with other considerations based upon depth and bottom treatment. It has been possible to adhere to this system throughout, excepting the vertical-sided group in which the point of maximum diameter was the chief factor. Each subtype is sufficiently elastic to accommodate a considerable range in form within a single series.

A. Outcurved	180
1. Shallow	34
a. With rounded bottoms	26
b. With flat bottoms	8
2. Medium	128
a. With rounded bottoms	58
b. With flat bottoms	70
3. Deep	18
B. Hemispherical	56
1. Shallow	26
a. With rounded bottoms	24
b. With flattened bottoms	2

2. Deep	30
a. With rounded bottoms	24
b. With flattened bottoms	6
C. Conical	8
D. Vertical-sided	12
1. Maximum diameter at rim	8
2. Maximum diameter at middle	3
3. Maximum diameter at base	1
E. Shouldered	12
1. Shallow	5
2. Deep	7
F. Incurved	5
1. Shallow	2
2. Deep	3
G. Recurved	1
H. Flat-bottomed	1
I. Oval	1

Total 276

A. OUTCURVED: As the name implies, the bowls of this type display a cross section of parabolic form, i.e., the walls diverge and terminate without being drawn in at the rim. Thus the greatest diameter falls at the rim proper and is reduced quickly or slowly towards the bottom of the bowl, depending upon the depth. Outcurved bowls numerically exceed the hemispherical form by a ratio of 3:1.

1. SHALLOW: When the depth of an outcurved bowl is equal to, or less than $\frac{1}{3}$ the maximum diameter, it falls under this heading (fig. 54, *a*; pl. 15, *a*). In small bowls of this variety the depth is never less than $\frac{1}{4}$ the diameter. Those with rounded bottoms range in diameters from a minimum of $4\frac{3}{8}$ inches to $19\frac{1}{2}$ inches, the latter being the largest complete specimen in the entire collection (pl. 16, *i*). The larger bowls, or trenchers as Cushing termed them, are of the so-called "bread" — or "mixing bowl" — type, which is not frequently encountered north of the Gila-Salt region. Rim treatments display only slight variations, the commonest form being direct and the less common types are flared or thickened internally (fig. 55, *a-c*).

The shallow, flat-bottomed bowls (pl. 15, *b*) are all small, diameters varying only from $5\frac{1}{4}$ to 7 inches. In three examples, the bottom is concave with a corresponding convexity in-

¹⁶⁸ This also includes fragmentary but restorable specimens.

ternally (fig. 54, *b*). In all cases, the sides are less curved than the bowls of the foregoing variety and the lips are rounded and slightly flared. Eversion of the rim and flat bottoms seem to be correlated features.

bowls are the most numerous of all subtypes. Rounded and flattened bottoms are about equally divided (fig. 54, *c-e*; pl. 15, *c-e*). Diameters range from about 4 to 12 inches with a mean of 8 inches. The rims again are either

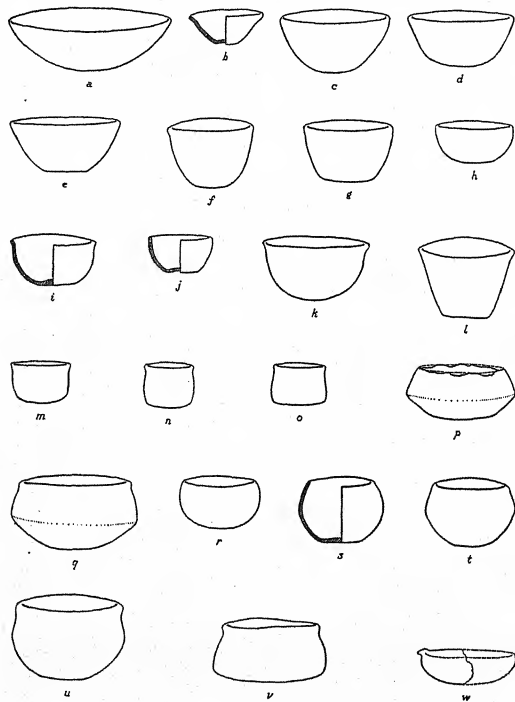


Fig. 54. Los Muertos. Gila and Salt Smudged bowl shapes.
Diameter of *a*, 12 $\frac{1}{2}$ inches.

2. MEDIUM: Bowls of this variety are distinguished from the shallow form by increased depth. The arbitrary standard used in segregating these is again based on the width-depth relationship, the specimen conforming to the subtype of its depth is equal to from one-half to one-third the diameter. Medium outcurved

direct, rounded, sometimes squared and rarely flared (fig. 55, *d-f*).

3. DEEP: These display a depth which is in excess of one-half the maximum diameter (fig. 54, *f, g*; pl. 15, *f, g*). Sizes run from 4 $\frac{1}{2}$ to 9 inches in diameter, the mean being about 6 inches. In all cases the bottoms are flat or only

slightly convex. About two-thirds of the eighteen specimens have direct rims, the remainder being moderately flared (fig. 55, *g, h*).

B. HEMISPHERICAL: 1. SHALLOW: The shallow variety with rounded bottoms is in all respects like the equivalent form in Gila Polychrome (fig. 54, *b*). Diameter range: $3\frac{1}{4}$ to 10 inches. Rims are direct and rounded (fig. 55, *i*). Variations in bottom treatment are seen

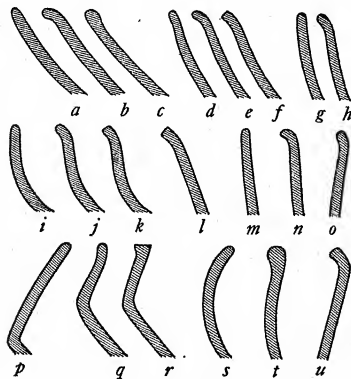


FIG. 55. Los Muertos. Gila and Salt Smudged rim sections of bowls.

in figures *i* and *j*, and rims in both cases are everted, the one rounded, the other squared (fig. 55, *j, k*).

2. DEEP: The deep, round-bottomed, hemispherical bowls range from 3 to 9 inches in diameter, the average being about $5\frac{1}{2}$ inches (fig. 54, *k*; pl. 15, *b*).

C. CONICAL: The depths in all cases are greater than $\frac{1}{2}$ the diameter, bottoms are flat but not concave, and the sides show little or no curve (fig. 54, *l*; pl. 16, *i*); rims in all instances are turned outwardly and roughly squared (fig. 55, *l*). Diameter range: 3 to $12\frac{1}{2}$ inches.

D. VERTICAL-SIDED: In profile, these resemble the vases, but the sides are not carried so high. The widths always exceed the depths. The size range is small, as the diameter extremes are only $3\frac{3}{4}$ to $6\frac{3}{8}$ inches. Variations in shape

are due to shifting the point of maximum diameter. As in the vases, this may be at the rim (fig. 54, *m*; pl. 16, *a*), at the middle (fig. 54, *n*; pl. 16, *b*), or at the base (fig. 54, *o*). The first form is the most abundant and the last is represented by only one example. The bottoms are all somewhat convex and the lips are flared in all but one case (fig. 55, *m-o*).

E. SHOULDERED: These are in marked contrast to the preceding varieties as the distinct incurvature of the upper part of the vessel produces a shoulder where the convex bottom part is met (fig. 54, *p, q*; pl. 16, *d*). The maximum diameter is found at this point and the mouths are up to about $1\frac{1}{2}$ inches less in width than the diameter over-all. The shallow and deep forms are again based on the width-depth ratio. In both varieties the bottoms are flattened and the shoulders either sharpened or somewhat rounded. Diameter range: $3\frac{3}{4}$ inches to $10\frac{1}{2}$ inches. In one instance, the rim is direct (fig. 55, *p*) and in the remaining bowls it takes a vertical turn and terminates in the majority of cases in a rounded lip (fig. 55, *q*) and in a single case in a squared, thickened lip (fig. 55, *r*).

F. INCURVED: There are but five examples of this type, two being shallow, i.e., the depth is less than one-half the diameter, and three are deep. The shallow examples measure $10\frac{3}{4}$ and 7 inches in diameter, respectively, and the bottoms are rounded. The degree of the incurvature of the rim (fig. 54, *r*; pl. 16, *e*) is about the same as in the polychrome bowls of the same shape class. In the deep specimens (pl. 16, *f*) the bottoms are somewhat flattened (fig. 54, *s*); one has a faint suggestion of a shoulder (fig. 54, *t*). Maximum diameters vary between 7 and 8 inches; rim edges in all cases are rounded (fig. 55, *s*) and lack eversion.

G. RECURVED: The single bowl of this variety has a maximum diameter of $9\frac{3}{4}$ inches. It suggests the deep recurved polychrome bowls (fig. 54, *u*; pl. 16, *h*). There is a trace of flattening on the bottom and the rim is thickened and squared at the top (fig. 55, *t*).

H. FLAT-BOTTOMED: While in its contours (fig. 54, *v*; pl. 16, *g*) this bowl resembles the vertical-sided examples, particularly the one with the greatest diameter at the base, the

depth is so much less in proportion to the width that it seems to fall into a distinct class.

I. OVAL: The chief point of interest on this fragmentary specimen is a well-marked spout located in one of the ends (fig. 54, *w*; pl. 16, *c*). This is the only instance of a spout on pottery in the entire Hemenway Collection. The bowl was probably about 9 inches in greatest diameter, the rim incurved and flattened.

Jars: The word "jar," as it is used in the following pages, applies to all vessels with wide or small mouths, with low or high necks, and with body forms that may run through a wide variety of modifications. It is an all-inclusive term, intended to simplify the classification of shapes, rather than to convey a direct impression as to a single shape. There was a temptation to create a "bottle" category for some of the smaller tall-necked vessels, but as practically the same type occurs in large vessels which obviously are not bottles, the smaller specimens have all been brought under this one heading.

The features which recur most frequently are the vertically compressed bodies, the "Gila shoulder," and the extended cylindrical necks. The top to bottom flattening of the body and the shoulders are already in evidence on jars from the earlier red-on-buff horizons, but the cylindrical neck is, from all indications, a fairly late trait.

The following classification is based primarily on body form; further subdivisions are created on the size of the mouth, and on the shoulder placement. Any jar showing in profile a sudden change in the curvature of the wall is considered as being shouldered. This may either be sharp or rounded. Large- and small-mouthed groups are created on the basis that the former have a mouth diameter greater than one-half the maximum width of the vessel. The mouth diameter of the latter is smaller than one-half the greatest width. It generally holds that the more extended the neck, the smaller the mouth. Consequently, tall-necked vessels invariably have small mouths. The chief point of interest concerning the shoulder is its position. If it is set well below the medial horizontal line on the body proper (disregarding the neck) it is low; if at, or near, the middle its position is medial, and, if well up on the

body it is high. The ellipsoidal jars lack all suggestion of the shoulder. Since the influence of the molds on which the jars were built is most strongly seen on the vessels of this category, that feature is used as a basis for further subdivision. It is either lacking, faint, or strongly marked. In the latter case, it materially affected the contours. The jar classification follows:

A. Shouldered		86
1. Large-mouthed		31
a. With low shoulder	6	
b. With medial shoulder	14	
c. With high shoulder	11	
2. Small-mouthed		55
a. With low shoulder	19	
b. With medial shoulder	26	
c. With high shoulder	10	
B. Ellipsoidal		31
1. Large-mouthed		7
2. Small-mouthed		24
a. Low-necked	1	
b. Tall-necked	23	
1'. Without mold impression	9	
2'. With faint impression	6	
3'. With strongly marked impression	8	
Total		<u>117</u>

A. SHOULDERED: 1. LARGE-MOUTHED: While the shouldered jars are in the majority, the large-mouthed shouldered group is in the minority. The type may be described as being low, broad in proportion to depth, and without a true neck. These form a transitional group between the shouldered bowls and the standard small-mouthed shouldered jars. Nearly all have polished and blackened interiors. Mold impressions are almost wholly lacking.

a. With Low Shoulder: These measure from a minimum of $4\frac{1}{2}$ inches to a maximum of $12\frac{3}{4}$ inches in diameter. As the shoulders are set very low, the bottoms are bent slightly convex doing away with the necessity of any flattening. The largest example (fig. 56, *a*) is the only one to show a concave bottom and the mold impression. The sides above the shoulder rise in a straight line, and although the rim is shattered, it apparently terminated without a flare. Figure 56, *b*, simpler in form, shows a low vertical rim. A dominantly convex profile of the upper part is seen in figure 56, *c*, and plate 17, *a*. The rims are direct or slightly flared and the lips rounded.

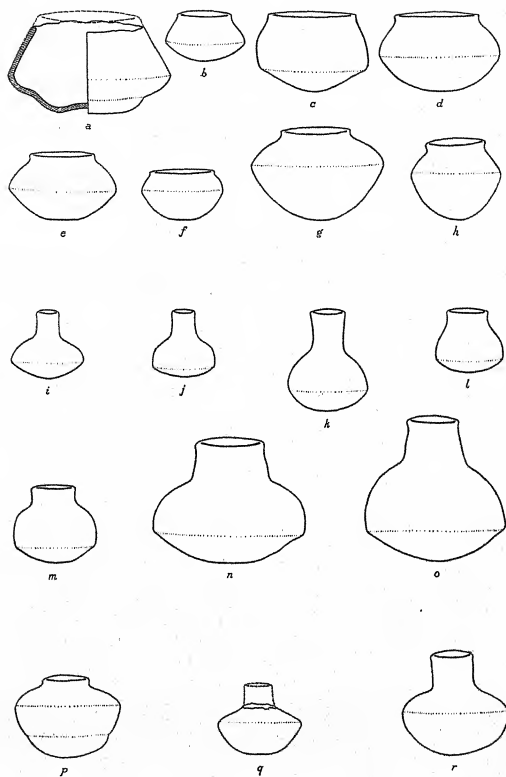


FIG. 56. Los Muertos. Gila and Salt Red jar shapes.
Diameter of *a*, 10½ inches.

b. *With Medial Shoulder*: The sizes range from $4\frac{1}{4}$ to $9\frac{3}{4}$ inches in maximum diameter and they differ from the preceding group mainly in the position of the shoulder which is near the middle part of the body (fig. 56, d, e; pl. 17, b). The upper half of the body is always convex and the bottoms in two instances are appreciably flattened. The rims show no further variations.

c. *With High Shoulder*: These tend not only to be relatively taller in proportion to the breadth than the allied forms, but the orifices are also reduced in size, on the average, yet remaining within the limit set for the large-mouthed group. The sizes run about the same as before. Because of the high shoulder, the bottom convexity is increased, giving rise to a moderate degree of flattening so that the vessel would maintain an upright position. Variations in form and a typical specimen will be seen in figure 56, f-h, and plate 17, c, d.

2. *SMALL-MOUTHED*: These comprise the largest single group in the collection and the general type can certainly be considered as the standard jar shape at Los Muertos, although in body form, neck treatment, and position of shoulder, there is again a wide gradation. In spite of the tall neck which many examples have, the diameters almost always exceed the height. Mold impressions are rare.

a. *With Low Shoulder*: The smallest and largest examples measure $5\frac{1}{4}$ and $12\frac{1}{2}$ inches in diameter respectively. Among the smaller examples are the bottle-like forms which have a very strongly flattened body and tall slender neck (fig. 56, i, j; pl. 17, e-h). In some instances the neck height almost equals the body height. These, however, are overwhelmed in numbers by examples with fuller bodies and necks with relatively larger diameters (fig. 56, k, m; pl. 17, f, g). Figure 56, l, in reality has too large a mouth to fall into this group, but it illustrates the blending and merging that leads from one group into another. The large low-shouldered jars are noted for a full upper body and the almost complete subordination of the base (fig. 56, n, o; pl. 17, i-k). Neck diameters are usually smallest at the rim in the largest jars. An inconspicuous eversion and rounding of the lip normally occurs.

b. *With Medial Shoulder*: Diameters range from 4 to 16 inches. Variations in shape of the smaller jars are well shown by the profile drawings in figure 57, a to i, and by examples a to e in plate 18. The bottle-like forms are again present and show the variable necks of cylindrical, tapered, and flared types. Figure 57, b is the only specimen in the series which has a height greater than the diameter and a concave bottom. Among the larger jars, two types of bottoms are generally seen (excepting those showing mold impressions), the one approaching the hemispherical (pl. 18, c, e) and the other of conoidal form (fig. 57, l, m). A strongly marked mold impression is seen in figure 57, j; plate 18, f. The body flattening of figure 57, k is somewhat more marked than the average for the group. The two largest and handsomest jars in the collection are almost identical as to size and shape (fig. 57, l, m; pl. 14, 18, d). The bases are both conoidal, the upper parts convex, and the shoulders are quite sharp. The greatest difference is evident in the necks, one being cylindrical and the other is slightly constricted medially.

The mammoth red ware jar found at Los Guanacos (pl. 80) shows the great size that was attained by individual specimens in this group. The location of the jar, which at present is regarded as a late type, in Los Guanacos must be questioned, since this site was abandoned and forgotten before Los Muertos came into being. The jar was undoubtedly the creation of the Los Muertos potters and by some strange circumstance found its way into the area where the deeply buried houses of Los Guanacos lay.

c. *With High Shoulder*: These are least common in the small-mouthed shouldered category. The high set shoulder leads to very flat upper bodies and strongly convex bases. The asymmetrical example in figure 56, p is the only one having a small mouth and lacking an extended neck. Figure 56, q and r seem to be the commoner forms of the high-shouldered type.

B. *ELLIPSOIDAL*: 1. *LARGE-MOUTHED*: The type is represented by only a few examples in Salt Red but there are many equivalents in the collection in the plain ware category. The

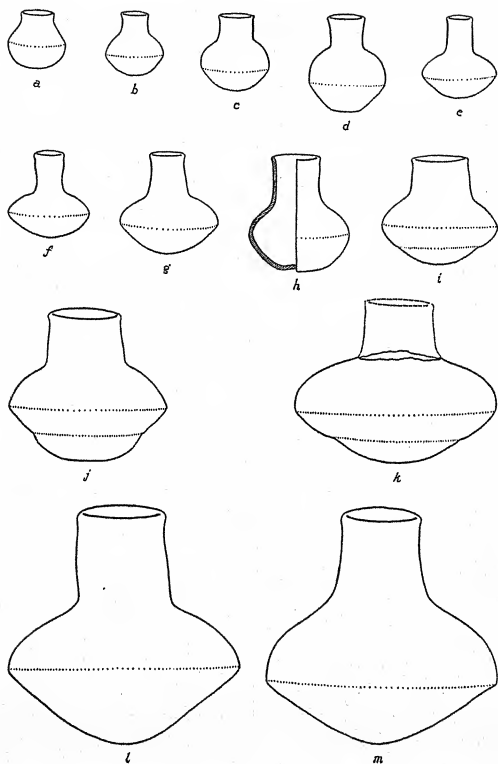


FIG. 57. Los Muertos, Gila and Salt Red shouldered jars.
Diameter of *l*, 16 inches.

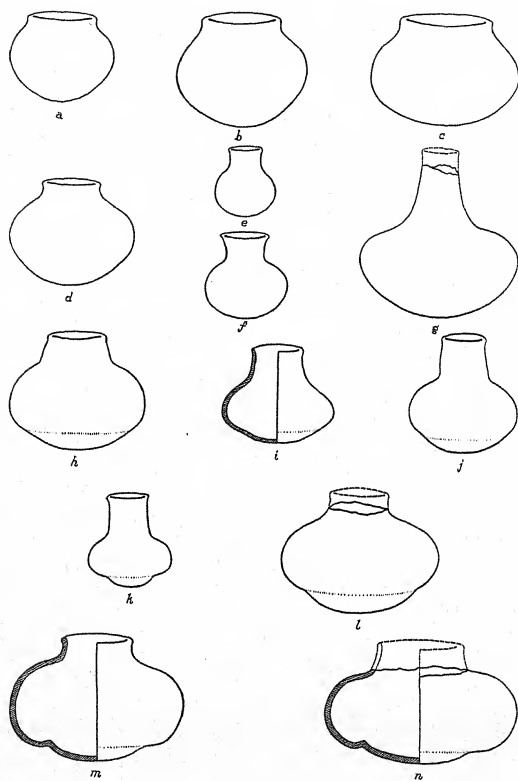


FIG. 58. Los Muertos. Gila and Salt Red jars.
Diameter of *n*, 14 inches.

bodies are only moderately flattened from top to bottom (fig. 58, *a-c*; pl. 19, *c*). Throughout the ellipsoidal series the greatest widths are reached at about the mid-point of the vertical height. The mouth diameters are in excess of one-half the maximum widths and the rims range from a very slight upturning at the mouth to low necks about one inch in height. The size limits are 6 and 12½ inches. The marks of the molding dishes are never present.

2. **SMALL-MOUTHED:** a. *Low-necked:* There is but one vessel of this type.

b. *Tall-necked:* Two general tendencies may be noted which were carried to a degree beyond that seen in any of the preceding types: (a) body flattening, and (b) the more prevalent occurrence of the mold impression. The subdivision of the tall-necked small-mouthed ellipsoidal jars is based upon the latter feature.

1'. *Without Mold Impression:* The extremes in diameters are 4¾ and 14 inches. The bodies are symmetrically shaped, having about the same degree of convexity above and below the mid-point of the body (fig. 58, *e-f*; pl. 19, *d*). A unique specimen, now in the Peabody Museum of Salem, has a very small and tall neck (fig. 58, *g*).

2'. *With Faint Impression:* The mold prints in this group did not greatly influence the general contours of the jars. They are usually marked by a slight offset only. The six jars show a very small range in size—between 8 and 10 inches. Both conical and cylindrical necks occur (fig. 58, *h-j*; pl. 19, *f, g*). One example (pl. 19, *h*) has a hole of 2-inch diameter cut through the side.

3'. *With Strongly Marked Impression:* Maximum body flattening is reached by the jars in this group. This seems to be correlated to some extent with the modifying effect of the supporting mold. The bottoms have become so differentiated from the bodies, because of this factor, that there is little resemblance to the original ellipsoidal jar with which the series started. Diameter range: 6½ to 14 inches (fig. 58, *k-n*; pl. 19, *h-j*).

Pitchers: In general, Gila and Salt Red pitchers follow the same pattern as found in Casa Grande Red-on-buff examples. They tend, however, to be somewhat more angular of body and to have a higher neck. Diameter range: 3 to 6 inches, average 5 inches. The rod-type handles rise from the rim's edge and are fastened to the body just below the neck.

Using body form as a basis for classification, the pitchers can be grouped as follows:

A. Spheroidal	5
B. Ellipsoidal	4
C. Shouldered	12
	—
	21

Spheroidal-bodied pitchers (fig. 59, *a-c*; pl. 20, *a, b*) differ only in the neck portion. Attention may be called again to the correlation between neck height and size of aperture, i.e., the higher the neck the smaller the mouth. The compressed or ellipsoidal examples (fig. 59, *d-f*; pl. 20, *c, f*) are subject to the same generalization. Shouldered pitchers are numerically the largest group of the lot. The normal position of the shoulder is at about the middle part of the body (fig. 59, *g-j*; pl. 20, *d, e*). Flattened bottoms are most strongly associated with the shouldered group and cylindrical necks are dominant.

Scoops: In the Gila-Salt region, the containers used in transferring liquids were of a standardized form which is distinct from the half-gourd and bowl-and-handle ladles of the northern Pueblo region. The type may be characterized as an oblong bowl, one end giving rise to an elevated tab varying as to height and form. This takes the place of a specialized handle. The origin of this type is not clear, although it appears as early as the Snaketown Phase in painted ware.¹⁰⁰ Later, it seems to have been reserved for red ware, as the few polychrome ladles in existence more nearly approach the half-gourd type. As a chronological guide, scoops are not particularly noteworthy but they may be looked upon as a product distinctive of the Hohokam. In distribution, the Gila scoop seems not to have

¹⁰⁰ Gladwin, Haury, Sayles, and Gladwin, 1937, fig.

spread far beyond the bounds of the area drained by that stream in Arizona.

The forty-nine scoops from Los Muertos range in length from 3 to 8¾ inches, the mean being about 5 inches. Interiors were rarely intentionally smudged black, and as polishing

indication of even a rudimentary handle. The four examples of this type range in length from 3 to 4½ inches and are of a flat oval shape when viewed from above. Evidently this form was in the minority and less typical than the following varieties.

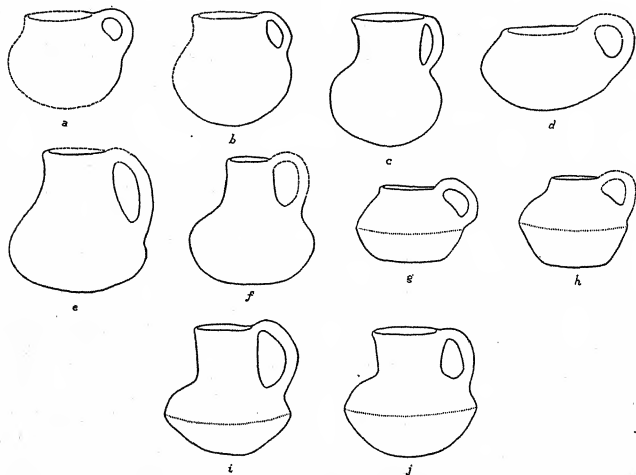


FIG. 59. Los Muertos. Gila and Salt Red pitcher shapes. Height of *c*, 5½ inches.

was so extensively done to eliminate the striations, practically all scoops fall in the Salt Red category. While there is an imperceptible gradation of one form into another, the following broad varieties may be recognized:

A. With horizontal rims	4
B. With handle end elevated	19
C. "Boat-shaped"	26
D. Cup-shaped	3
E. Anomalous forms	2
	—
	54

A. WITH HORIZONTAL RIMS: Scoops with horizontal rims (fig. 60, *a*, *a'*) are wholly lacking in distinctive characteristics. The dipping end is apt to be somewhat more expanded and deeper than the opposite end, but there is no

B. WITH HANDLE END ELEVATED: These differ from the preceding in that one end is elongated and extended above the level of the otherwise horizontal rim to produce an elementary tab for greater convenience in handling (fig. 60, *b*, *c*). In the following forms there is a gradual tendency to draw the handle out and differentiate it more from the body. This may be seen in the broad-handle type in figure 60, *d*, *d'*.

C. "BOAT-SHAPED": These are numerically in the majority and may be regarded as typical. As the descriptive term suggests, both the leading edge and the handle rise higher than the sides (fig. 60, *e-g*; pl. 25, *e*, *f*). In outline, there is a perceptible shortening in proportion to length (fig. 60, *e'-g'*), with an attendant deepening of the bowl part and a higher and

more vertical handle. A moderate flattening of the bottoms is sometimes noticed in dippers of this description. The example illustrated in plate 25, *e* is not only the largest in the collection but also shows a slight outward curvature of the handle which is not seen elsewhere. Two examples, one fragmentary, have an added feature in a "stop-ridge" at the handle end to protect the thumb (pl. 25, *c*).

(pl. 25, *b*). There is no indication of a handle and one edge curls sharply over the concavity.

All scoops bearing evidence of wear, show that they were used by right-handed individuals.

Russell reports¹⁷⁰ that scoops of the general types here described, when found in ruins by the Pima, take on a magical significance and are used to feed the sick.

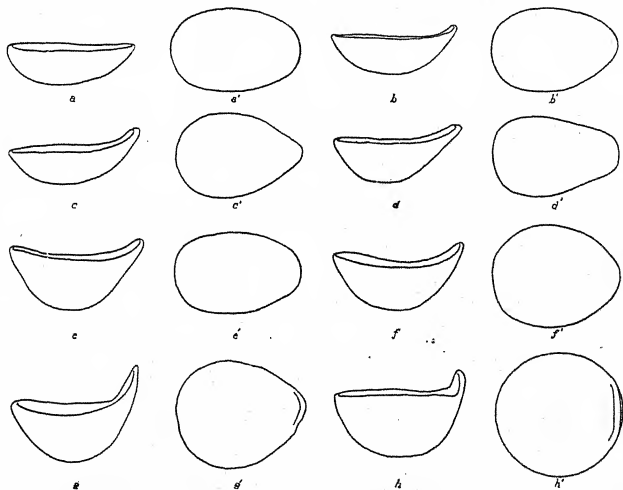


FIG. 60. Los Muertos. Variations in profile and outlines of Salt Red scoops. Average length, 5 inches.

D. CUP-SHAPED: The reduction of the bowl from an oval to a round outline culminated in what may be referred to as a cup-shaped dipper (fig. 60, *b*, *b'*). The rim again assumes a horizontal position, while the tab of more or less triangular shape rises almost vertically in direct projection from the wall. One of the three cup-shaped examples has the short stubby handle directed laterally practically in the same plane as the rim (pl. 25, *a*).

E. ANOMALOUS FORMS: Of the two anomalous scoops, one is flat and of more or less circular outline, the other is of interest because it seems to have been patterned after a shell

Beakers: The vessels so called are essentially of cylindrical form whose height is as great or greater than the maximum diameter. Nine examples are available for study, six coming from the cremation plots, two from burials, and one from a room. The average height is $5\frac{1}{4}$ inches; the average diameter, 4 inches. Bottoms are slightly convex, excepting one specimen which has a totally flat base, and rims are gently everted with edges rounded. Interiors were smudged and polished in the habitual fashion. On the basis of modifications of the sides the following variations may be noted:

¹⁷⁰ Russell, 1908, pp. 130-131.

A. Barrel-shaped	5
B. Maximum diameter at base	3
C. Maximum diameter at rim	.1
	<hr/> 9

A. BARREL-SHAPED BEAKERS (fig. 61, *a*; pl. 21, *b*) display a mouth and base of about equal dimensions while the sides are bulged, producing the greatest diameter at about the middle.

B. MAXIMUM DIAMETER AT BASE: In the type with expanded base, it follows that the orifice gives the smallest width (fig. 61, *b*, *c*; pl. 21, *d*).

C. MAXIMUM DIAMETER AT RIM: The third form with the larger mouth and reduced base is the reverse of the above (fig. 61, *d*; pl. 21, *f*).

The only other area in the Southwest which has yielded beakers in abundance is Chaco Canyon.¹⁷¹ Here they are relatively taller than those from Los Muertos and usually have small loop handles. Roberts¹⁷² records a cylindrical vessel from a Pueblo I site in the Piedra district, thus showing that the shape was known at an early time in the Pueblo area of the north. But whether or not this is in any way to be linked with the Gila beakers is difficult to say. Woodward¹⁷³ reports beakers in the Grewe site east of Casa Grande, a Colonial-Sedentary Period village, and obvious prototypes of these vessels appeared as early as the Pioneer Period at Snaketown.¹⁷⁴

Mugs: Complete and restorable mugs from Los Muertos number five. The cremation plots yielded four and the fifth was found with a burial. In size and shape, these resemble the beakers, the only difference being the addition of a heavy handle of round to oval cross section. Bottoms are flat or slightly convex and the rims may or may not terminate in a slight flare. The heights vary from about $\frac{3}{4}$ to 8 inches and the diameters are always less than the height. Interiors were blackened but not well polished. Two mug types are recognizable:

A. Barrel-shaped	3
B. Maximum diameter at base	2
	<hr/> 5

The first type is well represented by figure 61, *e*, *f* and plate 21, *g*, and the second type, showing an expansion of the base (fig. 61, *g*; pl. 21, *f*), has a relatively smaller mouth.

The interesting question again arises concerning the origin of the shape. As far as the present evidence goes, there were no ancestral forms of mugs in pure red-on-buff horizons which might have served as copies for the red ware types. In the absence of local prototypes, attention is at once shifted to the Mesa Verde region where contemporarily a parallel of the Gila mug existed in black-on-white ware. Mesa Verde mugs normally have flat bottoms, straight sides which are broadest at or near the base, square lips, and flat strap-like handles extending from near the rim to the vessel walls at the base.¹⁷⁵ They thus differ in certain respects, not the least of which is in the type of ware and decoration. Mesa Verde and the Gila, however, are separated by a territory of considerable size in which the extant ceramic forms do not include the mug and a link cannot be established. An occasional mug is found in Gila or Tonto Polychrome (pl. 11, *d*; pl. 77, *c*), but they do not appear in the earlier stage of the polychrome development and they may therefore be regarded as copies of the red ware forms rather than as the models for the latter. To the south in Chihuahua the mug does not appear as a standard part of the late Chihuahua Culture and for the remaining southern peripheral regions there is insufficient data on which to base any conclusions.

Cups: There is but one true cup (fig. 61, *b*) in the Los Muertos Collection, originating from a cremation plot. It is now in the Peabody Museum of Salem, Massachusetts. An arbitrary distinction may be drawn between cups and mugs in that the former show a diameter equal to or in excess of the height, whereas the reverse is the case in mugs.

Bird Effigies: Nine bird vessels, one of which is in the Peabody Museum of Salem, were recovered in the excavations at Los Muertos. Their distribution in the ruin was as follows: rooms, 4; burials, 2; cremations, 2; plaza, 1. The general characteristics may be summed

¹⁷¹ Pepper, 1920, pp. 120-122, pls. 2-6.

¹⁷² Roberts, 1930, p. 106, pl. 33a.

¹⁷³ Woodward, 1931, fig. 5.

¹⁷⁴ Gladwin, Haurly, Sayles, and Gladwin, 1937, fig. 109.

¹⁷⁵ Kidder, 1924, p. 61.

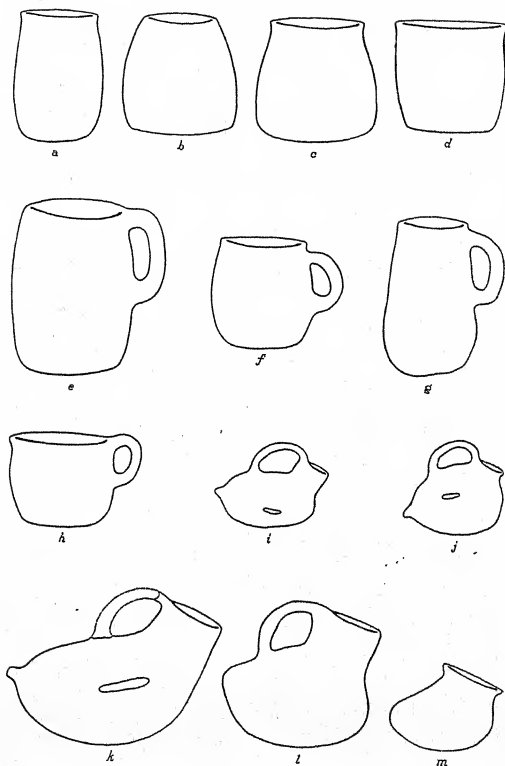


FIG. 61. Los Muertos. Salt Red beakers (a-d), mugs (e-g), cup (h), and bird effigy shapes (i-m). Height of e, $7\frac{1}{2}$ inches.

up in this manner: The body is definitely patterned after that of a bird and may be plump or elongated. The mouth takes the place of a head, is obliquely set, and gives rise to a rod handle which extends higher than any other part of the effigy and is fastened in the middle of the back. Conventional plastic representations of the wings and tail ordinarily occur at their appropriate places. The average length is about 6 inches. More specifically, the examples can be grouped as follows:

- A. With handle and plastic features 7
- B. With handle only 1
- C. Without handle and plastic features 1

The realistic type of bird effigy was the most common. Body variations of this group are as illustrated in figure 61, *i-k*, and plate 21, *a-c*. Wing and tail representations are horizontal ridges and in most cases are embellished with short vertical incisions.

One effigy jar in the collection has a handle but lacks the suggestive wing and tail features (fig. 61, *l*; pl. 21, *d*) and the last jar lacks both the plastic additions and the handle (fig. 61, *m*; pl. 21, *e*).

The problem of affinities of the Gila-Salt bird effigies was anticipated in a measure under the discussion of polychrome effigy jars. It was pointed out that analogous types already occur in Pueblo I sites in the San Juan area. Early examples from the Gila are not known. Black-on-white types of Pueblo times, however, do occur in the Little Colorado, in the Upper Gila,¹⁷⁶ and in the Tonto Basin, which, therefore, not only preserved the form but may also have transmitted it in late times to Gila and Salt Red.

Incurved Vessels: The small incurved container shown in plate 26, *a* does not fit in with any of the types so far established. Below the rim on opposite sides are two small holes, the perforations having been made since the vessel was fired and obviously for suspension.

Tripod Vessels: The collection has a single fragmentary legged vessel (pl. 26, *b*) of Gila Smudged, found with a cremation. The

three solid legs were attached to the vessel by inserting the ends into circular pits and smearing clay around the joints.

Legged vessels have been noted from Casa Grande by Fewkes¹⁷⁷ in the Grewe site,¹⁷⁸ Snaketown,¹⁷⁹ and tetrapod vessels, but otherwise similar, have been found in the Tonto Basin below the Mogollon Rim.¹⁸⁰ The earliest examples are from Snaketown where they ordinarily occurred in painted ware types. The rarity of the form outside of the Hohokam and the southern Salado area suggests that the Gila and Salt Smudged examples were derived from the red-on-buff forerunners. Further, the origin of the shape in the Southwest is probably assignable to a Mexican source where legged vessels not only were very common but also have a very long history.



FIG. 62. Los Muertos. Black decoration on exterior of red ware bowl.

Painted Red Ware

White-on-red: A fragmentary jar from a cremation provides the only evidence of white decoration on Salt Red at Los Muertos. The type is known, although rarely, from other points in the red ware area, notably in the Tonto Basin and in Papagueria.¹⁸¹ The decorations, as in this case, consist of narrow white lines usually in simple rectilinear patterns (pl. 26, *c*).¹⁸²

Black-on-red: Of some interest is a shallow red ware bowl (pl. 26, *d*) found, according to the field catalogue, near the surface in the trash mound of Ruin XXI. The bowl is 13 inches in diameter, red both inside and out and well polished. The rim is rounded and ends with a very slight lateral flare. The feature of interest is the obscure and erratic black design painted on the outer surface just below the rim (fig. 62). The pattern is a curvilinear

¹⁷⁶ Hough, 1907, pl. VII.

¹⁷⁷ Fewkes, 1912, p. 133; fig. 40, pl. 72.

¹⁷⁸ Woodward, 1931, fig. 5, no. 13.

¹⁷⁹ Gladwin, Haury, Sayles, and Gladwin, 1937, fig.

109; Haury, 1938.

¹⁸⁰ Gladwin, W. and H. S., 1930c, pl. XI.

¹⁸¹ Scantling, 1940.

¹⁸² Gladwin, W. and H. S., 1930c, p. 12.

meander repeated six times and executed with a thin semi-translucent black pigment which was completely burnt out in spots, suggesting a carbon substance. A secondary line follows the outlines of the meander on the upper sides and in the angles thus formed there occur solid black triangles.

The field record makes note of the fact that this bowl was "probably of more recent date than the pyral burials" exhumed near this specimen, and it must be assumed, therefore, that it became buried by chance in the trash mound, probably after the abandonment of the village. Although this bowl resembles Salt Red in shape, finish, and color, the black decoration is something new. Russell¹⁸³ illustrates a red ware bowl of recent Pima manufacture which indicates the persistence of the form into late times; he also shows a water jar decorated in black with a design very similar to that found on the red ware bowl.¹⁸⁴ In Pima decoration (probably derived from Maricopa) where lines meet in an acute angle, a small solid triangle is very often used to fill the corner in the manner of the bowl in question. Furthermore, the black pigment that the Pima employ at the present time has the same thin watery appearance. All of this points to a recent origin for the specimen, and it is a temptation to speculate whether or not the bowl represents a transitional form between Salt Red and the modern red of the Pima.

PLAIN WARE

Gila Plain

The plain ware of Los Muertos constitutes a category distinctly different from the polished red ware types just considered. The differences have to do with shape, finish, color, and size variation. Specifically, the type is Gila Plain.¹⁸⁵ Plain ware jars always have large mouths, i.e., the mouth diameter exceeds one-half the maximum jar diameter, low to absent necks, and a complete absence of sharp should-

ers. Slips likewise were not used and the bodies tend to be fuller than the average red ware jar; but nevertheless, the inclination towards vertical compression is still a noticeable feature.

The function of plain ware was purely culinary. Nearly all jars clearly show prolonged use over the kitchen hearth, a feature which red ware did not display. Because of its restriction to this use the preponderance of jars over any other shape is explained, and the consistently wide orifices are accounted for by the same reason.

Because plain ware filled this domestic want, one might assume it to be a basic ware, one at least which was subject to comparatively little aesthetic modification because of its utilitarian function. Hence, it is not surprising that few changes have been detected in Gila Plain through a long development.¹⁸⁶

The distribution of Gila Plain in Los Muertos gives a distorted picture. Only six specimens were found with burials, four in rooms, one floating specimen in a trash pile, a single example on the surface, and seventy-one pieces, a large number proportionately, were found in the cremation plots as containers for human ashes. The total figure of only eighty-three plain ware vessels as compared with nearly 500 red ware examples also presents a picture of ratios which is not borne out by the superabundance of plain ware sherds encountered in the trash mounds. Data gathered by Gladwin, Schmidt, and Schroeder¹⁸⁷ in stratigraphic tests show that from about sixty to eighty-five per cent of the sherd content in trash mounds was made up of plain ware.

The preponderance of plain ware containers in cremations over those found in burials is again a factor which should not be overlooked. As plain ware was specifically the product of the Hohokam and probably less characteristic of the immigrant polychrome people at the time of their arrival, it was only natural that, like the red-on-buff pottery, plain ware should have been used, rather than an alien ware, to enshrine the bones of their dead.

¹⁸³ Gladwin, Haury, Sayles, and Gladwin, 1937, pp.

222-223.

¹⁸⁴ Russell, 1908, pl. XXc, p. 131.

¹⁸⁵ Russell, 1908, fig. 53, b, p. 127. Also compare with Spier, 1933, fig. 7.

¹⁸⁶ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 205-211; Colton and Hargrave, 1937, pp. 174-175.

¹⁸⁷ Gladwin, 1928; Schmidt, 1928; Schroeder, 1940, p. 120, gives the per cent of Gila Plain to all pottery in the Civano Phase as 71.3, based on a sample of 1,000,000 sherds.

TECHNOLOGY

The paddle-and-anvil seems to have been consistently employed, but the mold imprints, noted as of frequent occurrence on red ware, are entirely wanting. There is, furthermore, no evidence that the two-piece method was used in plain ware. The necessity of this method may have been partly overcome by a slight average increase in the thickness of the vessel walls; also the replacement of the shoulder by symmetrically curved sides tended to distribute the stress of the overlying clay.

The paste is a reddish brown and rarely shows a black core. Overfiring produces a grayish tone. Temper consists of fine to coarse angular particles of quartzite with an abundance of mica. The amount is, as a rule, very rich and seems to constitute about fifty per cent of the gross paste. This is undoubtedly one cause for the softness and friableness of the fired products. This character is shown to advantage on the bottoms which are often worn to paper thinness from the inside due to the abrasion of dippers. A general weakness in the lower portions of jars may be ascribed to the constant contact with heat and the boiling of liquids which seems to have weakened the clay to the extent that the bottoms in some specimens all but fall out of their own accord.

Firing clouds occur as irregular black blotches, and excepting in one or two instances, they show no attempt whatever at arrangement. Exterior smoothing was done mainly with the hand as the striations caused by the papillae of the skin are clearly shown. Pebble polishing in some cases was resorted to, but it was haphazard and, because of the absence of a slip, it had little effect in producing a smooth surface. The striations extend mostly in a horizontal direction. Smudging, other than that caused by use, is not seen.

VESSEL FORMS

The lack of variety in shapes among the Gila Plain vessels as compared with those of the red and smudged types is sharp. The jar form mirrors a pattern which is already in evidence in the Colonial Period of Hohokam development, and the variations from this early standard in the current lot, with few exceptions, are

of a minor order. There is, also, in the jar category, a relatively small size range of individual specimens.

The Gila Plain vessels fall into the following shape groups:

Jars	66
Bowls	11
Scoops	3
Cup	1
Pitcher	1
Incurved vessel	1
	—
	83

Jars: A survey of the jars shows the following types:

A. Spheroidal	6
B. Ellipsoidal	48
1. With rounded bottom	36
2. With pointed bottom	8
3. With flattened bottom	4
C. Shouldered	4
1. Medially shouldered	2
2. High-shouldered	2
D. Handed	5
1. Horizontal handles	3
2. Vertical handles	2
E. "Bean pot" type	1
F. Vertically elongated	1
G. Egg-shaped, small-mouthed	1
	—
	66

A. SPHEROIDAL: The heights of the jars of this type are equal to or exceed slightly the maximum horizontal diameter. As the name suggests, the bodies are almost perfect spheres, and numerically the type is a subordinate one. The size range of greatest diameters is from 8½ to about 24 inches, the largest and most capacious examples being used no doubt for the storage of water or food products (fig. 63, *a, b*). Jars with a diameter of about 1 foot seem to be the more prevalent (fig. 63, *c*; pl. 22, *f*). Rim treatments in this and the remaining types vary within a small range as to height, degree of eversion, and rounding or squaring of the lip, and they seem, therefore, to be without any significance.

B. ELLIPSOIDAL: 1. ROUND-BOTTOMED: The typical plain ware jar from Los Muertos has a moderate top-to-bottom flattening which is re-

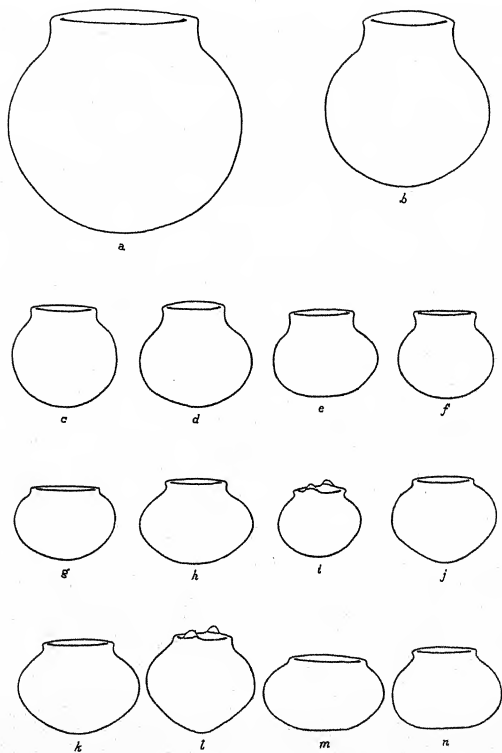


FIG. 63. Los Muertos. Gila Plain jar shapes. Diameter of *a*, 24 inches.

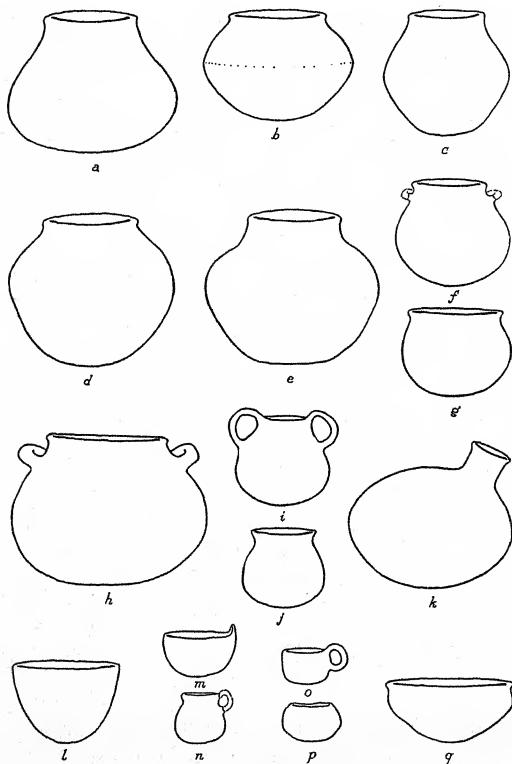


FIG. 64. Los Muertos. Gila Plain jar shapes. Diameter of *a*, 12¼ inches.

sponsible for a horizontal diameter that exceeds the height. While there is variation as to the amount of vertical compression, the contours are always formed by curves lacking in irregularities as would be caused by shoulders. The basal parts of bottoms are, therefore, of a pronounced rounded nature (fig. 63, *d-f*; fig. 64, *a*; pl. 22, *a, d, e*). One example, with a lower rim and relatively larger mouth than in the normal jar, is seen in figure 63, *g*. The average diameter of the ellipsoidal jar is about 11 inches. From a 15-inch rim sherd of a very large specimen we know that large sizes were attained. The diameter of the mouth of this jar was about 24 inches, while the body diameter must have been in the neighborhood of 35 or 40 inches. Measured capacities of several complete jars in existence range from 25 to 50 gallons.

One jar of this group exhibits on the rim at opposite points two "ears" or tabs (fig. 63, *i*). Present-day survivals are undoubtedly seen in the "ears" of the so-called "bean pot" type of jar made by the Pima and Papago.¹⁸⁸

2. WITH POINTED BOTTOMS: The elongation of the basal portions of jars was responsible for the more pointed bottom form as seen in figure 63, *j, k* and plate 22, *b*. The reason for this modification is not clear. An eared example will be seen in figure 63, *l*. Diameters range from 10 to 13½ inches.

3. WITH FLAT BOTTOMS: These show the maximum degree of vertical flattening and the consequent result was a nearly flat base (fig. 63, *m, n*; pl. 22, *c*). The sizes differ very little from those given above.

C. SHOULDERED: For want of a better name, jars with more accentuated profiles than those of the foregoing groups have been termed shouldered. It should be pointed out, however, that sharp shoulders of Gila and Salt Red, excepting one case, are lacking.

1. MEDIANLY SHOULDERED: Two forms are represented (fig. 64, *b, c*; pl. 23, *a*). The first is relatively low in proportion to height and has the only semblance of a sharpened shoulder in the entire lot of plain ware pots. Its diameter

is 10½ inches. The second form is elongated and has a flat bottom.

2. HIGH-SHOULDERED: The maximum diameter is reached at a point above the center of the vessel (fig. 64, *d, e*; pl. 23, *b*).

D. HANDLED: The double-handled jars, although few in numbers, seem to be confined to the plain ware as they did not appear at all in any of the red, smudged red ware, or decorated vessels. Gila Plain from earlier phases only rarely exhibits this feature.¹⁸⁹ With the probable introduction of the pitcher, mug, and bird effigy forms possibly via the Salado, the use of a handled vessel became much more common.

1. HORIZONTAL HANDLES: There are three jars, each bearing a pair of handles attached horizontally from one to two inches below the rim (fig. 64, *f, b*; pl. 23, *c*). Handles of this type were directed up and out and attachment was made by inserting the ends through holes in the vessel's side and riveting them on the inside.

2. VERTICAL HANDLES: The handled jar shown in plate 23, *d* (fig. 64, *i*) is one of two of this type. Its diameter is 6¼ inches and the other example is slightly larger. The shape is seen first in the Hohokam ceramics in Santa Cruz Buff of the Santa Cruz Phase.¹⁹⁰

E. "BEAN POT" TYPE: This specimen (fig. 64, *g*) is so-called because of its approximation in shape to the bean pot, until recently in use among the Pima.¹⁹¹ It is reminiscent of the deep recurved bowl of the polychrome ware, but it is even deeper in proportion to the width, and the mouth is somewhat more constricted.

F. VERTICALLY ELONGATED: The smallest jar in the collection showing soot blackening is the only one of this type (fig. 64, *j*). Although its diameter is 5¼ inches and the height 5½ inches, its elongated appearance is gained by the large mouth formed by the strongly flared rim.

G. EGG-SHAPED, SMALL-MOUTHED: This jar (fig. 64, *k*; pl. 23, *e*) is the only one of its kind in the entire collection. The body length is 11¼ inches, and the orifice, which is set far to one side and directed laterally, is but 2½

¹⁸⁸ Russell, 1908, pl. XVIII, *b*.

¹⁸⁹ Gladwin, Haurly, Sayles, and Gladwin, 1937, fig. 100, *c*.

¹⁹⁰ Gladwin, Haurly, Sayles, and Gladwin, 1937, pl. CLXXI.

¹⁹¹ Russell, 1908, p. 128, pl. XVIII, *b*.

inches in diameter. The prevailing color is a light buff and the surfaces before firing were smoothed by hand. The black stains following the minute cracks on the body below the neck were caused by pitch, smeared over the seams to stop leaks. The vessel was probably designed as a water canteen, and the shape, as suggested at an earlier point, may be the extreme modification of the bird effigy jar as described above.

The field records state that the specimen was found on the surface of Ruin XVII where it had been "lifted out of the central room by the roots of a small shrub." Even if the jar were typical of those produced by the excavations in Los Muertos, its appearance on the surface by root action of this kind would have to be seriously questioned. Its shape, the extremely small mouth, and the remnant of the pitch-smeared cracks, argue for an origin much more recent than the occupation of the ruin. The small-mouthed jars were made and used by the Pimas within historic times and up until recently, when the influence of the white man has tended to displace the type. Similar, though symmetrically shaped jars, have recently been reported from caves in the Twenty-Nine Palms region,¹⁰² which together with the current specimen undoubtedly represent the peripheral examples of a jar type whose focus appears to have been in the Lower Gila and Lower Colorado River basins. The Los Muertos specimen was doubtless left on the spot in recent time, after Ruin XVII was reduced to the form in which the members of the Hemenway Expedition found it.

Bowls: Classified according to the system adopted for the red ware, Gila Plain bowls fall into the following groups:

A. Outcurved	7
1. Shallow	3
2. Medium	2
3. Deep	2
B. Conical	1
C. Shouldered	2
D. Recurved	1
	—
	11

Further discussion of the types in question hardly seems necessary in view of their similarity to types already described. The sizes are all small, ranging from somewhat over 3 inches to about 12 inches in the case of one shallow outcurved form. A deep outcurved bowl is shown in figure 64, *l* and plate 23, *f*. Of great interest are the two round-shouldered bowls which differ from the red types in that the bottoms of the former were pointed (fig. 64, *q*; pl. 23, *g*).

Scoops: Of the three examples, the first has a horizontal rim, the second has the handle end elevated, and the third is a cup-like specimen with a small vestigial handle on the rim (fig. 64, *m*).

Cup: The small hemispherical cup illustrated in figure 64, *o* resembles a modern tea-cup.

Pitcher: The diminutive handled vessel of figure 64, *n* is unlike the standard pitcher form in its large mouth and flat bottom.

Incurved Vessel: The irregularities and asymmetry of this vessel (fig. 64, *p*) stamp it as the product of a novice.

INTRUSIVE POTTERY

The intrusive pottery from Los Muertos is all in the nature of sherds, the majority of which were picked up on the surface. Those found in the diggings are not well documented so that direct associations cannot be drawn. Nevertheless, considerable importance may be attached to them as showing the possible time range during which the site was occupied in the light of Pueblo pre-history; the latest intrusive sherds are particularly instructive in indicating the recency of occupation in the village. Furthermore, one gains some idea as to the ceramically different but contemporary communities with which Los Muertos was in touch.

Decorated

The foreign decorated sherds in the collection are identifiable as shown in the table on the following page.

¹⁰² Campbell, 1931, pp. 41-54.

A. Black-on-white	13
1. Black Mesa ¹⁹³ (pl. 24, a)	1
2. Flagstaff ¹⁹⁴ (pl. 24, b, c)	4
3. Tularosa ¹⁹⁵ (pl. 24, d, f)	4
4. Roosevelt ¹⁹⁶ (pl. 24, e, g)	3
5. Kana-a ¹⁹⁷ (pl. 24, h)	1
B. Polychrome	4
1. Four-mile ¹⁹⁸ (pl. 24, i)	3
2. Hybrid glaze, Hawikuh series (pl. 24, l)	1
C. Black-on-yellow	4
1. Jeddito ¹⁹⁹ (pl. 24, j, k)	4
D. Red-on-white (pl. 24, m)	1
	—
	22

Clearly, these sherds represent a considerable span of time, ranging from Kana-a Black-on-white of the eighth and ninth centuries to the polychromes and Jeddito Black-on-yellow of the fourteenth and fifteenth centuries. Since all the types, with the exception of Four-mile Polychrome, the Zuni glaze piece and Jeddito Black-on-yellow, are not directly associated with Gila and Tonto Polychromes in the heart of the Salado area, always occurring in earlier contexts, it may be inferred that the black-on-whites reached Los Muertos while it was still a comparatively young settlement and before it was swelled by the increment of people of Salado origin. And the late types may be taken to reflect the time of the later years of the village's history.

Examining the late types in somewhat greater detail, we find that they issued from two culture areas to the northeast of the Gila-Salt region. The first of these is the Upper Salt drainage from about Cherry Creek on the west to White River on the east, and north of the upper Salt River system to about Taylor on the Colorado Plateau.²⁰⁰ This was the home of Four-mile Polychrome and it is here also where Gila and Tonto Polychromes often occur directly associated with it.²⁰¹ Adjoining this area on the northeast, and best regarded still as

a part of it, is the region of the Zuni ruins. The evidence of contact with this section is embodied in the only glazed sherd the site produced (pl. 24, l). It is a reddish bowl fragment, decorated both inside and out with a bright green glaze bordered with a mat color of purplish hue. Dr. F. W. Hodge, to whom the sherd was submitted for identification, describes it as a "cross between Type II and Type IV" in the Hawikuh series,²⁰² i.e., "the glaze and mat red typically applied to bowls with a white slip inside and out (Type IV), in the present case, appear on a bowl of Type II."

The second of these major areas was the Hopi country, characterized in late prehistoric times by Jeddito Black-on-yellow.

Two of the four sherds of this type from Los Muertos came to light with a cremation in Ruin XIII. The actual connection with the urn may be dubious, but the relatively frequent appearance of the type in other ruins in the region removes any possibility of chance intrusion, and one concludes that contacts with the Hopi region were fairly well established. On the grounds of tree-ring dates, Colton and Hargrave place the beginning of the ware in the early 1300's and the ending date about 1600.²⁰³ Since Jeddito Black-on-yellow was contemporary with Four-mile Polychrome at least during the early part of its life and possibly with the Zuni glazed sherd, the three ceramic types are indicative of what undoubtedly were the final outside contacts of Los Muertos. This must have been after the influx of the makers of polychrome.

The Chihuahua influence recognized in the polychrome effigy vessels would lead one to expect intrusive sherds from that area. But none are included in the lot of foreign sherds from Los Muertos. Chihuahua sherds have been found by Gladwin in the trash mounds at Casa Grande.²⁰⁴

Since the contemporaneity of Jeddito Black-on-yellow, Four-mile Polychrome, and Gila

¹⁹³ Colton and Hargrave, 1937, pp. 208-209; Colton, 1941, pp. 164-165.

¹⁹⁴ Colton and Hargrave, 1937, pp. 225-227.

¹⁹⁵ Colton and Hargrave, 1937, pp. 240-241.

¹⁹⁶ Gladwin, W. and H. S., 1931, p. 47-49.

¹⁹⁷ Colton and Hargrave, 1937, pp. 205-206.

¹⁹⁸ Colton and Hargrave, 1937, pp. 109-111.

¹⁹⁹ Colton and Hargrave, 1937, pp. 150-151.

²⁰⁰ Haury, 1934a, p. 129, fig. 23.

²⁰¹ Cummings, 1940, p. 85, *et seq.*

²⁰² For a series of Hawikuh pottery see Hodge, 1924, pp. 8-15.

²⁰³ Colton and Hargrave, 1937, p. 150.

²⁰⁴ Gladwin, W. and H. S., 1929a, p. 29, pl. V.

Polychrome have been demonstrated by tree-ring dating, the appearance of these types in Los Muertos from which no datable timbers have come, is the basis for the approximate dating of the site. While the date of founding is uncertain, Los Muertos probably had reached its peak in size late in the 1300's or early in the 1400's. In the absence of any associated culture elements of historical derivations, it may be concluded that the village was abandoned prior to the appearance of the Spanish Conquerors. This is wholly in accord with the facts known of Casa Grande, La Ciudad, and Pueblo Grande.

Corrugated Ware

Since the carriers of Gila Polychrome were familiar with the coiling technique of pottery making, it might be expected that they should have made locally at least a few corrugated jars. The bulk of the evidence, however, goes to show that they did not. Out of the great mass of material recovered from Los Muertos there are parts of only four identifiably different corrugated jars. The paste of three of these is of a reddish-brown color externally; the tempering material is finer and the amount of mica is less than in the average locally made jars of red ware and plain ware. The paste is also noticeably harder than native pottery so that we are justified in concluding that the corrugated types represented are importations.

From the fragments of three jars (pl. 27, *a-d*, *f*; fig. 65), the following common characteristics may be noted: large mouths, ellipsoidal bodies, low out-turned rims, and corrugating covering only about the upper half of the vessels, the lower parts being smoothed, but not polished; the inner surfaces are scraped

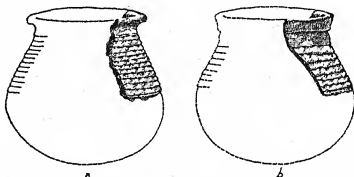


Fig. 65. Los Muertos. Reconstructed shapes of intrusive neck-corrugated jars.

and in one case pebble polished. The small sherd (pl. 27, *e*), representing the fourth jar, is of a different and unplaced type.

The coiling of the upper parts of jars only seems to be a well-established feature in the late Salado ruins lying to the east and north of the Lower Salt region. It occurs also in earlier horizons in the San Francisco drainage and in the Mimbres Culture area.²⁰⁵ Since the jar fragments in question are of a late type and concurrent with Gila Polychrome in other localities, their presence in Los Muertos is not out of harmony with the facts.

MISCELLANEOUS CLAY OBJECTS

Miniature Vessels: Most of the miniature vessels are doubtless the work of children who were imitating their mothers. For this reason, with few exceptions, the small receptacles are very irregular in outline and crudely made. Only two specimens show the use of slips and painted designs were seldom employed. All of the vessels here regarded as miniatures have diameters of 3 inches or less. But their smallness does not preclude the fact that they may not have been made for some express purpose.

Their occurrence, as recorded in the field register, was mainly confined to rooms and with child burials. In two cases each, they accompanied cremations and adult burials.

As to shape the specimens may be grouped as follows:

Bowls (fig. 66, <i>a-c</i>)	12
Jars (fig. 66, <i>d-f</i>)	6
Dippers (fig. 66, <i>g, h</i>)	4
Bird effigy (fig. 66, <i>i</i>)	1
	—

23

²⁰⁵ Bradfield, 1931, pl. LXXXIX; Cosgrove, 1932, pp. 83-84, pl. 92.

Griddles: Judging purely from negative evidence, the Hohokam of the Colonial and probably the Sedentary Periods did not use either a flat stone or a specially constructed pottery slab in the baking of thin cornmeal bread. Indeed, this may be taken as an indication that the tortilla-like article of diet had not

Complete *comales*, or griddles, have heretofore not been reported from the Gila-Salt region. The three unbroken specimens (pl. 28) and fragments from Los Muertos are of interest therefore in giving us a fairly complete picture of the trait. Fewkes²⁰⁶ figured a piece of one from Casa Grande, but because it was not

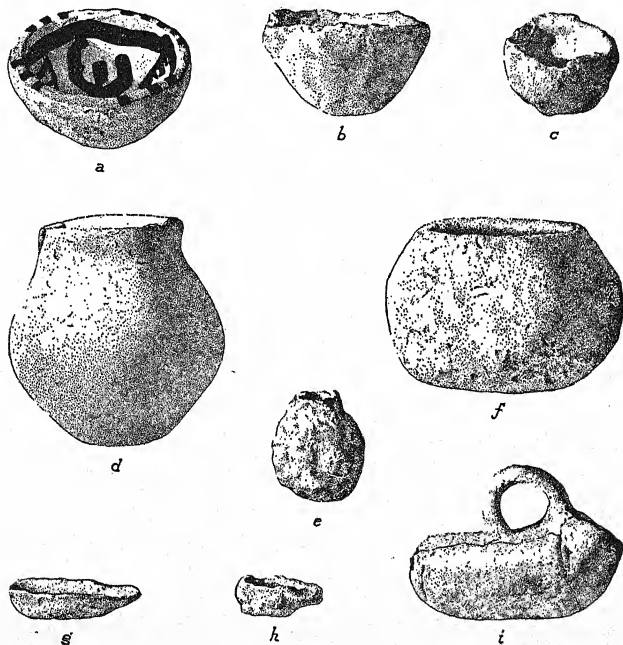


FIG. 66. Los Muertos. Miniature vessels. Diameter of *a*, 2½ inches.

yet become a part of the daily fare. Not until the Classic Period, in such ruins as Los Muertos and Casa Grande, do baking slabs come to light. Whereas among the Pueblos today these are rectangular and of stone, the specimens from Los Muertos are all of circular form and constructed of potters' clay, apparently of the same kind used in making Gila Plain.

heavily burnt, he adduced no use for it. The method of construction seems to have been a simple one. A batch of clay was pressed into a circular shape to a thickness of about ¾ of an inch on a coarse twilled mat. When dry, the griddle could be lifted from the mat without difficulty and without fear of having included in the clay any undesirable foreign

²⁰⁶ Fewkes, 1912, pp. 136-137.

bodies. The firing of the object completed the operation. The impression of the mat is in many cases very sharply preserved (pl. 28, *a'*, *b'*; pl. 75). It is so consistent a feature on these objects, and occurring on nothing else, that a small fragment of a baking slab can be surely identified by the mat impression. Only one specimen in the collection was not fashioned on the mat, the bottom being smooth.

Extra pains were not taken to produce a smooth or highly polished baking surface. Hand smoothing seems to have been the limit. Stone griddles from Pecos are reported²⁰⁷ to have highly polished surfaces "intensified and made lustrous black by constant rubbing and greasing." This same characteristic is also to be seen on present-day griddles of the Pueblo Indians. While the surfaces of the Los Muertos *comales* are fire-stained and blotched, they reveal no indication of the highly finished and blackened surface that would come automatically through use. The porosity of the clay obviously had something to do with this, but the chief cause may lie in a probable difference in the procedure of baking. The Pueblo wafer-bread, known as *piki* among the Hopi, is made by deftly spreading the thin batter on a heated stone slab. The edges begin to curl almost at once and shortly the paper-thin bread can be lifted from the stone and rolled, or left flat as desired. The necessity of a highly polished surface in this method is apparent, for a porous face would only lead to the inevitable result of sticking.

The Hohokam, on the other hand, probably mixed a stiff dough of which small portions were flattened-out pancake-like between the hands and then placed on the griddle to bake. Under such circumstances the necessity of a smooth baking surface would be eliminated by the stiffness of the dough. There is, of course, no archaeological verification for the supposition that this method was employed by the Hohokam, but this type of bread baking has persisted among the Pima, their allied tribes, and the Mexican groups to the south.

In size the Los Muertos griddles range from a minimum of about 9 inches to a maximum of 13 $\frac{3}{8}$ inches. The thickness of the largest slab

(pl. 28, *c*) is only $\frac{1}{2}$ of an inch, while the rest measure about $\frac{3}{4}$ of an inch in thickness. In addition to the largest complete specimen, the other two unbroken ones measure 13 $\frac{1}{4}$ and 12 $\frac{1}{4}$ inches in diameter respectively (pl. 28, *a* and *b*).

All of the slabs are slightly ridged about the edges. This effect was obtained either by slightly curling the edges upward (fig. 67, *a*) or by adding a definite lip (fig. 67, *b*, *c*).

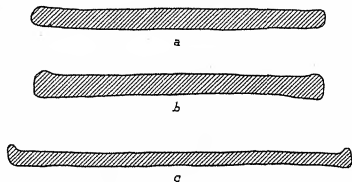


FIG. 67. Los Muertos. Sections of earthenware baking griddles. Diameter of *c*, 13 $\frac{3}{8}$ inches.

The occurrences of the griddles in Los Muertos were without exception in the domestic rooms and in almost every case there was associated with them other culinary equipment. In one room a metate lay nearby, while in another there were vessels. The whole griddles were found in one house, labeled in the field notes as the "room of the *comales*." With them were found several red ware bowls and two Gila Polychrome bowls.

Whether or not it was customary to support the griddles above the coals with blocks of stone, as the Pueblo Indians do, is a matter of conjecture. Apparently none were found in this position. Adhering to the bottom of one slab are ashes which may suggest that the slabs were laid directly on a bed of hot embers. The intense heat has caused the largest example to be considerably warped.

As to the precise origin of the trait, there are few data. The tortilla, or a similar form of bread, necessitating the use of a baking surface, is almost certainly an importation from the south. The baking slab apparently did not reach the Gila Basin until late prehistoric times. While the custom seems to be a deeply rooted

²⁰⁷ Kidder, 1932, p. 75.

one in Pueblo life, Kidder reports²⁰⁸ that fragments of griddles from Pecos did not antedate Glaze III strata, again suggesting the late pre-Spanish appearance of the trait in the Rio Grande.

The absence of the round clay slabs in excavated Salado ruins which were contemporary with Los Muertos, but located farther to the east and north, would indicate that slab baking was primarily taken over by the Hohokam.

The round earthen and the rectangular stone slabs have in their respective areas persisted to the present day. The particulars of making wafer-bread among the Zuñi²⁰⁹ and the Hopi²¹⁰ are well known. The Pimas also make a bread by parching, but this is much thicker than that of the Pueblos. In the process they use, or did until recently, a clay slab of circular form. Russell²¹¹ writes that "a tortilla baking plate is sometimes seen. It is nothing more than a slightly concave undecorated disc." The particular specimen which he collected measured about 14 inches in diameter, thus exceeding only by a very small margin the largest griddle here reported from Los Muertos.

Perforated Plates: Among the sherds from Los Muertos were fragments of 13 shallow plate-like vessels bearing marginal perforations. The type has previously been reported mainly from the Kayenta district and its apparent abundance in the Gila-Salt region, at least in Los Muertos, is a fact which attracts attention. The current sherds are all from different specimens and, since the paste is indistinguishable from that found in locally made plain wares, it may be inferred that the objects were not intrusive. They were probably introduced in the Hohokam territory by the Salado.

The diameters, reconstructed from the fragments, range from about 10 to 12 inches, and the depths probably did not exceed 2 inches. The under surfaces are usually rough while the inner surfaces have been smoothed but neither polished nor slipped. The method of construction seems to have been by broad coils, as in five instances the last coil has been exteriorly thickened to form a sort of rim (fig. 68, *a-c*;

pl. 29, *a-c*). The other examples lack this rim feature and the edges are finished in simple fashion (pl. 29, *d, e*). Variations will be seen in figure 68, *d-f*.

The marginal holes in all cases were punched in the still-plastic clay from the inside. These were set in from $\frac{1}{2}$ to $1\frac{1}{2}$ inches from the

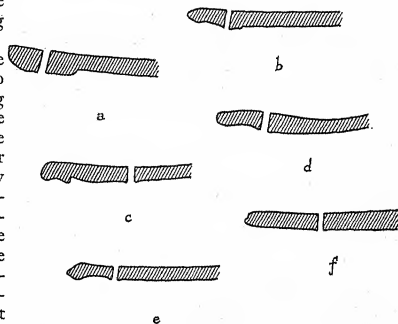


FIG. 68. Los Muertos. Rim sections of perforated plates.

edge, the majority being within an inch. On the sherds with thickened rims, the perforations pass directly through them in all but one case. In the exception they were set considerably farther away from the rim (fig. 68, *c*). The perforations vary in diameter from $\frac{1}{8}$ to $\frac{3}{16}$ of an inch.

The occurrence of the perforated sherds in Los Muertos leads to no conclusions as to their possible function. Three fragments were unearthed with cremations, but as in the case of the intrusive sherds, these may have been in the rubbish about the jars. Several were picked up from the surface and the rest were in rooms. Cushing regarded the objects as chafing dishes or as covers for jars; yet, they seem to be of such a specialized nature and almost always alike wherever found that they probably served a more definite use. Hough²¹² believed them to be the molds on which pottery vessels were formed, citing as evidence the adherence

²⁰⁸ Kidder, 1932, p. 75.

²⁰⁹ Cushing, 1920, pp. 317-343.

²¹⁰ Hough, 1915, pp. 63-64.

²¹¹ Russell, 1908, p. 129.

²¹² Hough, 1903, pp. 337 and 343.

to one plate of a small amount of potters' clay. Evidence to bear this out was found by the writer²¹³ on a plate with a double row of holes, recovered in Pinedale ruin, to which adhered a small amount of unfired sherd-tempered clay. But of what use the marginal holes

perforated plates were on the whole larger and shallower than the molds used in making red ware. They could have been employed, however, by the polychrome potters whose jars do not show the mold feature.

As to distribution, their prevalence in the

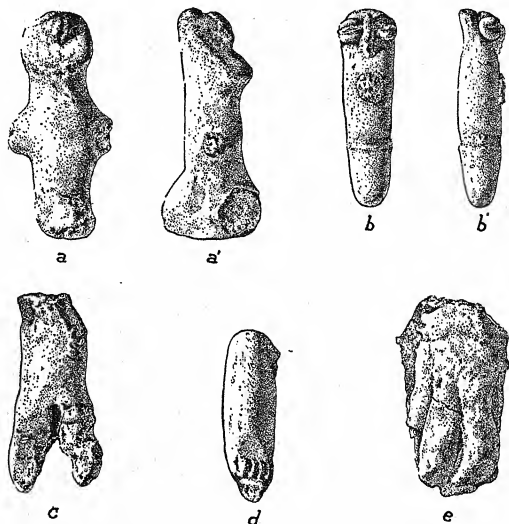


FIG. 69. Los Muertos. Human figurines and fragments.
Length of *a*, 1 1/4 inches.

could be, if the plates were used in this capacity, is not at all clear. It is furthermore of interest to note that the red ware jars of Los Muertos exhibiting the mold impression show no trace whatever of any small knobs that might have been formed by the pressing of clay into the holes. While the bottoms were smoothed after the removal of the mold, it would seem that, out of the many cases which show this feature, some slight evidence of this nature would be forthcoming. In trying to fit the broken fragments to the curvatures of the jar impressions, it is evident at once that the

Salt shows the area of dispersion to be less localized than has heretofore been believed. Since most of the specimens have been recovered from ruins in northern Arizona,²¹⁴ the focus may lie in that area. Perforated plates were not found by the Hemenway Expedition in the more ancient ruins of the Salt River Valley and they may be regarded as a minor diagnostic of the Civano Phase.

Figurines: Both human and animal figurines were found in the various ruin units of Los Muertos, but the number in each category is so small that figurines cannot have played

²¹³ Haury and Hargrave, 1931, pp. 68-69.

²¹⁴ Kidder and Guernsey, 1919, p. 143; Fewkes, 1911, pl. 15, *b*; Hough, 1903, p. 343; Judd, 1930a, pp. 68-69.

an important part in the culture as a whole. This condition might be contrary to expectations in view of the relatively great use of figurines among the Hohokam of earlier periods. Figurines appear to have been on the way out by Classic Period times.

HUMAN: There are but two complete human images and three fragments, of which one is questionable. The first of these (fig. 69, *a*, *a'*) was found in Ruin III. It is made of a gray-colored paste containing much coarse quartz and other grit; it was not polished, although it has been smoothed to the extent that all finger dents and irregularities produced in the modeling have been removed. As will be seen in the drawing, the anatomical features have undergone much reduction and simplification. The top of the rod-like body has been flattened into an oval area $\frac{3}{4}$ of an inch in greatest length. This is inclined at an angle of about 45 degrees. From the upper middle of this area rises a narrow ridge which portrays the nose. It seems to have been pinched out of the facial plane rather than added as a separate piece. The nostrils, eyes, and mouth are not indicated. The arms are rudimentary appendages extended laterally from slightly below the mid-point of the body. In the basal part, the legs have been completely subordinated to a flattening in order that the figure will maintain an upright position.

The second figurine (fig. 69, *b*, *b'*), found in Ruin XIV, is of a somewhat different type. The paste is of a brownish-red color and the tempering particles are very fine, so much so that there is almost no evidence of them on the surface. The figure was assembled by adding bits of clay to a foundation rod, tapered at one end, and pinched flat at the other. On this flattened portion there were mounted a convex nose and a pair of eyes of the "coffee bean" type.²¹⁶ The mouth is not indicated. To the thorax region was pressed a thin pellet of clay bearing a punctate treatment. Neither arms nor legs were added to the figure. About $\frac{1}{2}$ of an inch from the lower end is a very shallow groove, hardly perceptible to the eye, and along the lower fringe of this groove is an

irregular and very low ridge. In the field register, Cushing comments that this image was a representation of a sacred clown in mask, known in Zuni as "Ko-yo-ma-shi," and that it was intended to be socketed in a wooden figure. To what extent this interpretation of Zuni usages can be applied to an area where Zuni features as we know them were at a minimum is a matter of question; but the image was undoubtedly only a unit of a larger composite object.

Figure 69, *c* is probably the torso and lower limbs of a crude image. How much of the upper part has been lost and what its nature was is impossible to reconstruct because of the lack of complete models. It differs from the preceding figures in that the legs are portrayed. Further evidence of limb portrayal is also seen in figure 69, *d*.

A unique bit of plastic work will be seen in figure 69, *e*. The identification as a part of a human effigy is questioned, but it is included here on the basis of its similarity with the "skirt" terminus type of figurine reported by Morss²¹⁶ from the Fremont River in Utah.

On first sight, it would appear to represent a hand, but further examination shows it to be a series of eight or nine strips of clay about $\frac{1}{4}$ of an inch in width which have been attached to a clay core $\frac{3}{4}$ of an inch in diameter. Only three of the strips remain, but the marks of the others are clearly seen. The total length of the object is $1\frac{1}{4}$ inches. There is, of course, no way of determining whether or not this specimen actually formed the distal end of a figurine, since complete ones, as far as I know, have never been found anywhere in the Gila Basin. The Los Muertos fragment does not have the horizontal band displayed by most of the Fremont figurines.

To return to the first two figurines described, the former has certain analogies with figurines from other districts in the Southwest, notably those from the little studied ruins about Prescott.²¹⁷ These consistently show the ridge-like nose on a flattened facial plane; the eyes are sometimes represented by narrow slits, the mouth is similarly shown in a few cases, but

²¹⁶ Spinden, 1922, pp. 52-53.

²¹⁷ Morss, 1931, pp. 49-50.

²¹⁷ A large collection of figurines made by Mr. J. W. Simmons south of Prescott is now in Gila Pueblo. The

the suppression of the legs and arms is a notable feature. In a few cases the base is expanded to provide more footing as in the Los Muertos specimen. Further grounds for linking this Salt River figurine with those from Prescott is the fact that in the latter area there also occur small

broken specimen which he shows (fig. 97, *b*; fig. 98, *a*) is almost identical in that it has a flat base, rudimentary arms, and the oval face with a simple convex nose ridge. The genetic relationship of this type, which apparently was widely distributed, certainly carries back to

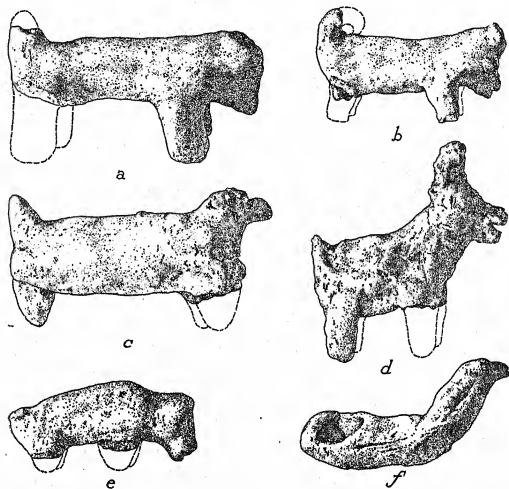


Fig. 70. Los Muertos. Animal figurines. Length of *a*, $3\frac{1}{4}$ inches.

animal figurines and "pulley-type" spindle whorls which parallel those found by the Hemenway Expedition. These articles in the Prescott area occur in ruins with a type of pottery known as Verde Black-on-gray.²¹⁸ The same figurine type is also pictured from the Flagstaff area²¹⁹ and the San Pedro Valley where the ruins are clearly affiliated with those of the Gila-Salt region.²²⁰

Again, a similarity is seen between these and Kidder's type D from Pecos.²²¹ The one un-

comparison is based on these. (See Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CCVII.)

²¹⁸ Gladwin, W. and H. S., 1930b, p. 176; Colton and Hargrave, 1937, pp. 184-186.

²¹⁹ McGregor, 1941, pp. 77-78.

²²⁰ Fewkes, 1909; fig. 75, *f* and *b*.

the early Hohokam figurine, so well represented at Snaketown.²²²

The peg-like image from Los Muertos (fig. 69, *b*) strongly reflects characteristics of Santa Cruz Phase figurines.²²³ This is seen particularly in the "coffee-bean" eyes and in the little applied punctate pellet which probably is the same as the chin ornament on some Santa Cruz Phase figurines. It may be suspected that this specimen was a carry-over from earlier times and therefore not a criterion of the Classic

²²¹ Kidder, 1932, pp. 123-125.

²²² Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 236-237.

²²³ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXC VII.

Period. In fact it may be concluded from the scarcity of figures in Los Muertos, as well as in other ruins of the Classic Period, that as a trait figurines were all but non-existent in this late period of Hohokam history.

ANIMAL: During the earlier phases of the Hohokam occupation in the Gila-Salt region, animal effigies can be regarded as one of the more conspicuous cultural attributes. These took the form either of animals in the full round (pl. 82) or as zoömorphie vessels (fig. 112, *b*). This emphasis on animals later disintegrated until during the Los Muertos times almost nothing of the idea remained. The few crude quadruped effigies recovered at Los Muertos were probably made for children if not by them.

There are seven figures representing quadrupeds and one composite form consisting of an animal head and neck combined with a miniature dipper. The catalogue fails to state the exact location where these were found, but since only two came from the same ruin unit, we know that they were not concentrated in a single room as were the remarkable examples from Los Guanacos. The clay in all cases has fairly coarse tempering and is a reddish color when not blackened by poor firing. Only two were pebble smoothed, and the rest show many irregularities resulting from the molding. A representative series will be seen in figure 70.

Spindle Whorls: These must be considered under two headings: (a) the specialized whorls of plastic clay and fired, and (b) the perforated discs ground out of fragments of earthenware vessels.²²⁴

SPECIALIZED WHORLS: There can be no doubt that the majority, at least, of the objects identified here as spindle whorls were actually used as such. Cushing notes on the card catalogue that one of these was found on the partly decomposed wooden spindle shaft of which there now remains no evidence. The whorls from the Gila-Salt region arouse some little interest because of their similarity in form to types found in Mexico, and because of their dissimilarity to equivalent objects found in the northern and more strictly speaking Pueblo territory.

Prepared clay, as used in pottery making, constitutes the material. Only three of the thirty-four examples from Los Muertos were slipped and pebble polished. The remaining were smoothed with the fingers as well as possible, and in about fifty per cent of the specimens further treatment was accorded by making very crude decorative incisions.

The variations in form are brought out in the following classification. The style of ornamentation and the relative thickness or thinness of the individual specimens are used as a basis for further subdivision:

A. Spheroidal		4
1. Plain	2	
2. Medially grooved	2	
B. Ellipsoidal		13
1. Plain	4	
2. Medially grooved	5	
3. Vertically incised	1	
4. Medially grooved and vertically incised	2	
5. Punctate	1	
C. Discoidal		5
1. Thin	2	
2. Thick	3	
a. Vertically incised	1	
b. Medially grooved and vertically incised	2	
D. Biconical		4
1. Plain	2	
2. Medially grooved	1	
3. Radially incised	1	
E. Pulley-shaped		6
1. Thin	4	
2. Thick	2	
F. Biconvex		1
G. Turbinate		1
		34

A. SPHEROIDAL: Whorls of this category (fig. 71, *a, a'*) are among the less common types in the collection. Diameters taken at the axis of the perforation and again at right angles to this give practically the same results.

B. ELLIPSOIDAL: Variation in this type (fig. 71, *b, b'*) is noted in the degree of compression. The range is from the subspherical on the one hand to the thick discoidal form on the other.

discs may also have had many other uses.

²²⁴ It is admitted, of course, that perforated sherd

Figure 71, *c*, *c'* is one of the examples in which the perforation seems to have been made after the whorl was formed by forcing a twig or a similar instrument through the soft clay.

on one side and slightly convex on the other; figure 71, *e*, *e'* is a more exact copy of the perforated sherd type in that it is concave-convex and thin. Its diameter is $1\frac{7}{8}$ inches. Both of

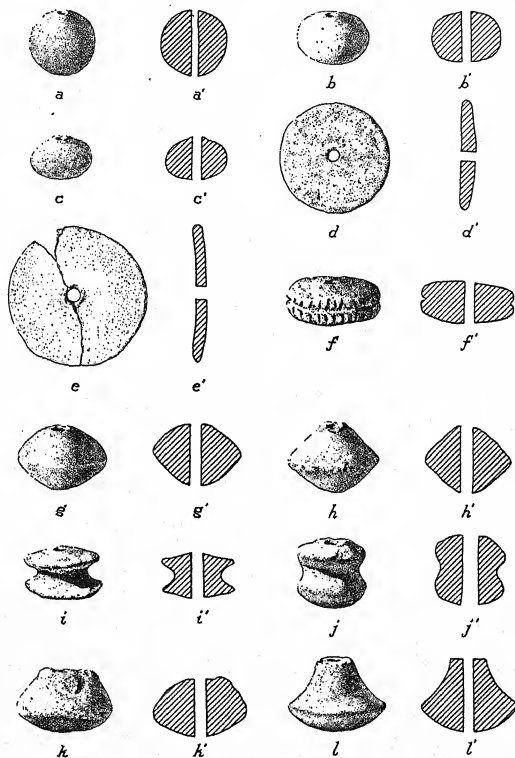


FIG. 71. Los Muertos. Spindle whorl types. Diameter of *e*, $1\frac{7}{8}$ inches.

C. DISCOIDAL: Although there are only two of the thin discoidal whorls, they prove to be of some interest because they are transitional in type between the perforated sherds described later and the truly specialized whorls. Figure 71, *d*, *d'*, $1\frac{1}{8}$ inches in diameter, is flat

these were specially molded in clay and then fired.

The thick discoidal whorls (fig. 71, *f*, *f'*) have smaller diameters than the thin type. The faces are usually flat but in one case one face is moderately concave.

D. BICONICAL: In this type the maximum diameter is reached along a sharpened edge at about the mid-point of the height, i.e., the two cones which make up the mass are symmetrical or nearly so (fig. 71, g, g'). The shaft hole pierces the apices of the cones. An occasional specimen shows a pinched-up ridge about the middle (fig. 71, h, h'). In all of the Los Muertos specimens of this type the diameters exceed the height.

E. PULLEY-SHAPED: This curious type is almost a perfect duplicate of a modern pulley, hence the term which defines it. Both thin and thick types occur (fig. 71, i, i', j, j'). The grooves in some cases attain considerable depth. It seems improbable that this medial groove could have served any other purpose than ornamentation. The shallow furrow which occurs mainly on the spheroidal, ellipsoidal, and thick discoidal forms, may have been the earliest forms of medial grooving, later to be exaggerated and transformed into the pulley-type. There is, however, no chronological evidence for this assumption.

F. BICONVEX: The single specimen which answers this description is the nearest approach to the typical Mexican type of spindle whorl (fig. 71, k, k'). Yet its differences are noteworthy. Like the Mexican whorls it is slipped and polished, red in color, and is more carefully and symmetrically shaped than the average Los Muertos whorl. While the base is much less convex than the upper side, it is far from flat as the southern forms usually are. It also lacks any incised decoration. Near the shaft hole are three low warts of clay, features which are not duplicated by any of the examples in the Hemenway Collection. Mr. William W. Howells informs me that he has seen whorls from Mexico that showed the same treatment in an evident attempt to copy a three-legged bowl. The diameter of this specimen is $1\frac{5}{16}$ inches and the thickness $\frac{3}{4}$ of an inch.

G. TURBINATED: This example has also been nicely finished by slipping and pebble polishing (fig. 71, l, l'). The basal section is convex; the upper part is extended, concave in profile, and forms a sharp shoulder where it joins the hemispherical lower part. The diameter at the

shoulder is $1\frac{1}{8}$ inches, the height 1 inch. In this, and the preceding specimen, the shaft hole diameter is $\frac{5}{32}$ of an inch and of an even bore throughout.

In the collection of whorls now in the museum of Phillips Academy, Andover, made by Mr. Warren K. Moorehead in the Salt River Valley near Phoenix,²²⁵ the same general types as here listed are present. There is, in addition, one whorl of stellar form, having five points pinched out from the main body along the line of greatest circumference.

The further considerations of size and weight of the various types of whorls has been purposely delayed to this point, since these factors are fairly constant and can be summed up without the need of tiresome repetition. Disregarding the thin discoidal types, all of the whorls from Los Muertos have a range in diameter of only $\frac{1}{8}$ to $1\frac{1}{8}$ inches. Frequencies in size groups are noted as follows:

Less than 1 inch in diameter	17
1 to $1\frac{1}{8}$ inches in diameter	5
$1\frac{1}{4}$ to $1\frac{3}{4}$ inches in diameter	10

There is no significant correlation between size and type.

The apertures vary in diameter from $\frac{1}{16}$ to $\frac{1}{4}$ of an inch, the average being about $\frac{5}{32}$ of an inch. The spindle holes are of an even gauge throughout the length and in the majority of cases they are centrally located. In a few exceptions the apertures are not at the true mid-point, and the whorls could therefore not have been accurately balanced on the spindle shaft. It is impossible to tell whether the perforations were made by molding the whorls around a shaft, or whether they were manufactured by piercing after molding and before firing. The latter seems to have been the case in some of the thinner specimens.

In weight, the Los Muertos whorls vary from $\frac{1}{4}$ of an ounce to a trifle over $\frac{3}{4}$ of an ounce, the average being slightly over $\frac{1}{2}$ of an ounce. The two thin discoidal specimens weigh approximately $\frac{1}{2}$ of an ounce each.

Ornamentation was confined almost solely to incising, but this is very primitive as com-

²²⁵ See Moorehead, 1906, pp. 89-105.

pared with the form of decoration seen on whorls from Mexico. The engraving seems to have been done with a stick and in a few cases with a sharp bit of flint or like material. There is no regularity in the markings either as to width or to spacing. The simplest forms were

perforation outwards to the equator, is seen in only one instance, a biconical whorl (fig. 72, *b*). Both cones were treated with four radiating lines, the cuttings falling opposite each other on the two surfaces. The surface of the smallest and lightest whorl in the collection is

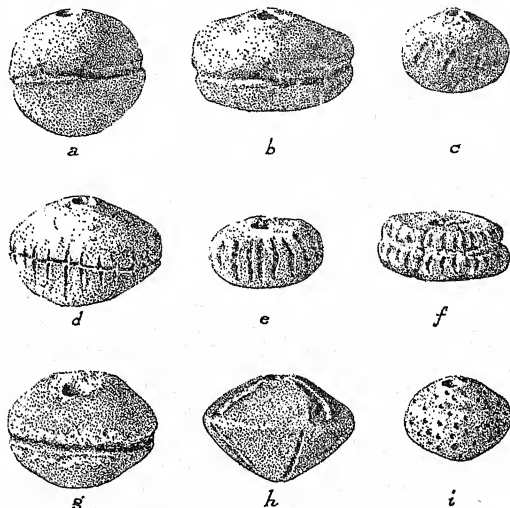


FIG. 72. Los Muertos. Forms of decoration on spindle whorls. Diameter of *a*, 1 inch.

made by cutting a groove at the largest diameter of the whorl (fig. 72, *a*, *b*). This occurs most frequently on the spheroidal, ellipsoidal, and thick discoidal types. One biconical example (fig. 72, *g*) also shows it. As previously suggested, the deepening of the groove may have led to the making of the distinct pulley-type whorl. Vertical incisions, which impart a cog-wheel effect to the specimen, occur alone (fig. 72, *c*, *e*) but more frequently in combination with the medial groove (fig. 72, *d*, *f*). These are again characteristically found on the spheroidal, ellipsoidal, and thick discoidal types. Radial incising, i.e., extending from the

covered with minute punctations (fig. 72, *i*), the only instance where this technique was employed. Plastic additions were noted on the biconvex specimen (fig. 71, *k*). Decoration by painting does not occur.

PERFORATED SHERDS: These were manufactured from convenient jar fragments by breaking them into a circular form and grinding down the edges, although this latter step was not always included. A representative series will be found in plate 30. The thirty-odd examples from Los Muertos vary from $1\frac{1}{8}$ to $2\frac{1}{2}$ inches in diameter; the size which is most frequently repeated is about $1\frac{1}{2}$ inches in

diameter. Weights are approximately the same as in the specialized whorls, although the heaviest run over one ounce. Since a few of the specialized whorls weighed as little as $\frac{1}{4}$ of an ounce, the small perforated sherds, which are of equal lightness, can conceivably have been used for the same purpose.

The grinding of two of the discs (pl. 30, *k*, *l*) was carried beyond the usual edge abrading. The convex surfaces are unaltered but by rubbing the articles over an abrasive stone with concave surfaces down, the edges were considerably sharpened, the shape in cross section approaching that seen in figure 71, *d'*. All of the locally made pottery types of Los Muertos are represented in the sherd whorls. Only two, however, are of polychrome, ten are of red-on-buff, and the remaining are of red and plain ware.

DISTRIBUTION AND COMPARISONS: Round perforated sherds are found almost everywhere, not only in Southwestern but also in Mexican ruins and in many pottery-bearing sites the world over. They were made as early as the Sweetwater Phase at Snaketown²²⁶ among the Hohokam but apparently did not become common in the San Juan until about Pueblo III times. There is therefore nothing distinctive or particularly significant about them either from the standpoint of time or place.

The specialized whorls of clay, on the other hand, have a much more limited distribution. Fewkes, who figured an example from Casa Grande,²²⁷ commented that they had not been found north of the Mogollon Rim, although some years later he himself recovered several during the excavations of Elden Pueblo near Flagstaff.²²⁸ and McGregor²²⁹ reports finding fifteen in the Winona-Ridge ruin area. Hough illustrates²³⁰ one from a cavate lodge near Camp Verde and they are quite common about Prescott. In every respect these are like the Gila types. None have been recorded from

the Rio Grande, the Mimbres, the eastern peripheral region, or the whole of the northern area. The Flagstaff area, the Middle Gila, and southern Arizona appear at present to be the areas of greatest occurrence in the Southwest.²³¹ The distribution was therefore much more limited than the sherd type of disc and centered well within the sphere of Hohokam occupation and influence. The type obviously came to the area late in the Sedentary Period and achieved prominence in the Classic Period.

Turning to the comparison of Gila spindle whorl types with others from adjacent areas, one finds that those from Mexico offer the most striking analogies. Attention was called to this similarity a number of years ago by Hough.²³² Yet, the differences are sufficiently great to prevent any conclusions as to direct linkage. The typical Aztec and Toltec whorl from the Valley of Mexico is either of hemispherical form or like the frustrum of a cone, usually elaborately ornamented by incising or stamping. They are on the average larger and heavier than the Southwestern types. The nearest approach to these in the Los Muertos lot is the biconvex example (fig. 71, *k*). Occasional biconical whorls from the south are rather close images of some of the Los Muertos examples. The turbinated form also has counterparts in the Mexican types but they seem to be rare.

From the vicinity of Vera Cruz, spindle whorls have been described²³³ that are less ornamental than those from the Valley of Mexico, and in certain respects are more like the Southwestern types. One has the medial groove, although in this case it is not precisely in the center, and the profile of the whorl is somewhat more angular. Another roughly biconical form has a series of low-relief knobs around the equator. A third resembles the turbinated type. Perforated sherds also occur here. The pulley type seems to be without any close analogies in all of Mexico. A recent re-

²²⁶ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 243.

²²⁷ Fewkes, 1912, p. 136, fig. 43.

²²⁸ Fewkes, 1927, p. 213.

²²⁹ McGregor, 1941, pp. 74-76.

²³⁰ Hough, 1914, p. 73.

²³¹ Red slipped and polished whorls of varying shapes have recently been shown to have been common in Papagueria (Scantling, 1940, p. 38) during the Sells Phase, comparable in time with the Civano Phase of the Gila-Salt area.

²³² Hough, 1914, p. 73.

²³³ Strebel, 1885, pl. 12, figs. 19, 20, 21.

connaissance along the Pacific coast of Sinaloa and Nayarit, Mexico, has produced whorls even more analogous to the Southwestern types

Gila Basin examples. The associated cultural material of the Sinaloa-Nayarit whorls has a decidedly southern cast and bears no strong re-

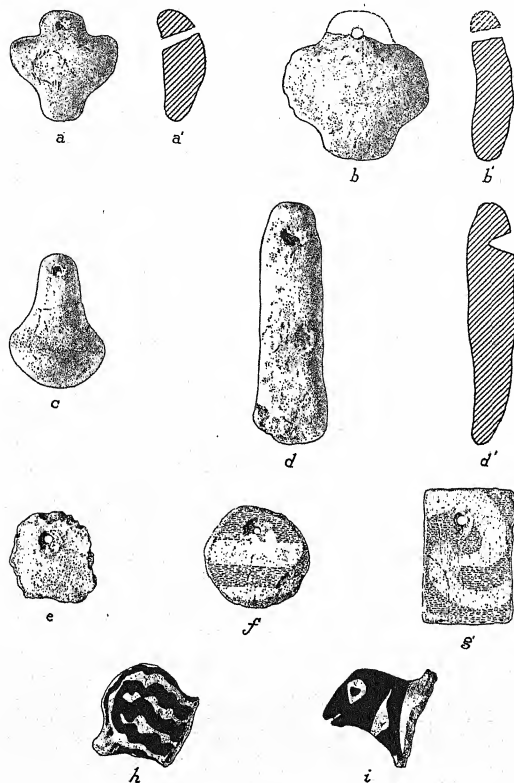


FIG. 73. Los Muertos. Clay pendants (a-g) and heads of bird jars with broken edges ground down. Length of d, $2\frac{1}{2}$ inches.

than the cases just mentioned.²⁸⁴ These are in the main of biconical form, being usually engraved with simple patterns as compared with those farther south yet more elaborate than the

semblance to the Southwest. Kidder reports a fragmentary whorl, probably of northwestern Mexican origin, in Pecos²⁸⁵ and McGregor²⁸⁶ also suggests a southern origin for

²⁸⁴ Sauer and Brand, 1932, p. 34, fig. 10.

²⁸⁵ Kidder, 1932, pp. 143-144, 309.

²⁸⁶ McGregor, 1941, p. 75, fig. 22, a.

one from near Flagstaff. There are, thus, certain superficial links with Mexican whorls, chiefly in shape, and a possible traded example. It may be assumed, I believe, that the South-western specialized spindle whorls fall somewhere into the pattern of the Mexican whorls but deductions concerning actual historical connections must await a time when larger collections from the Hohokam area are available for study and when the intervening area is better known.

Clay Pendants: A few rather bulky pendants of burnt clay are in the Los Muertos Collection. The first of these (fig. 73, *a*, *a'*) is undoubtedly a conventional representation of a bird with outstretched wings. It was found in Ruin III in a small Salt Red pitcher with a small amount of paint material. The color of the pendant is a dull brown and the surfaces are unpolished. On the back in more or less circular form is a series of faint fingernail impressions. The second pendant (fig. 73, *b*, *b'*) is of the same general type.

Figure 73, *c* is a plummet-shaped pendant $1\frac{1}{4}$ inches long, brown in color and the surfaces are not smoothed. An object which may or may not have been designed as a pendant will be seen in figure 73, *d*, *d'*. Near the upper end is a conical hole, an unfinished attempt to make a perforation after baking. The lower end flares out and is considerably flattened.

Worked Potsherds: The collection contains numerous discs and several pendants made from sherds.

The discs total fifty-six in number and run from $\frac{7}{8}$ to $3\frac{1}{8}$ inches in diameter. As a rule the edges of these are less expertly finished than are the whorl discs. All types of pottery locally made in Los Muertos are represented.

Sherds worked into pendants are represented by only three specimens. The first, of Salt Red (fig. 73, *e*) is rough and untrimmed; the second (fig. 73, *f*) is a more carefully made disc of red-on-buff; and the third (fig. 73, *g*) is neatly trimmed into a rectangular form, also red-on-buff, decorated on both sides, but of the variety regarded as intrusive in Los Muertos from the south.

No doubt the bird heads seen in figure 73, *b*, *i* were used by children as toys. Both are from Gila Polychrome jars, the edges carelessly ground down.

Textile-impressed Sherd: A few bottom fragments of a large Salt Red jar with the external mold imprint display on the inner surface the sharp impression of a loosely woven but fairly fine-threaded basket-weave textile. Since the fragments do not include parts of the jar above the mold print, it is impossible to say whether the impress of the textile carried upwards to the neck. The textile imprint is somewhat clouded in spots by the appearance underneath of an earlier impression in which the warp and weft trend in a slightly different direction.

The writer has seen several other instances of basket-weave cloth prints on vessel interiors: the first of these was found in the Tanque Verde village east of Tucson, dating from the early phase of the Classic Period;²³⁷ the second was a small, nearly complete, Gila Red jar from the Rye Creek ruin, 80 miles north of Globe, Arizona.

The probable explanation for these textile impressions on jar interiors is that potters occasionally used cloth-covered anvils, a practice which has persisted to the present day.²³⁸

Pottery Scrapers: One of the implements associated with the coil-scraper method of making pottery is a scraper or smoother, used on the inner surface of vessels.²³⁹ While this tool is at the present time most frequently made of gourd rind among the Pueblos, in earlier days a broken potsherd often served the purpose. Only one tool of this kind (fig. 74, *a*) was found in Los Muertos in a room of Ruin X or the annex to Ruin I. The sherd selected was from near the bottom of a jar which bore the impression of the molding dish. It will be recalled that this was a characteristic of Classic Period pottery, particularly Salt Red, and further that it was at this time when Gila Polychrome was made which required the use of the scraping spoon. This tool may certainly be accredited to the Salado contingent of Los Muertos.

water, uses a cloth-covered gourd as an anvil. Information from Julian Hayden.

²³⁸ Guthe, 1925, p. 27.

²³⁷ The Tanque Verde Phase, the equivalent in the Tucson area of the Soho Phase of the Gila Basin.

²³⁸ Annie Jackson, a Pima Indian of north Black-

Pipes: Investigations in the Gila-Salt area have shown it to be quite destitute of either stone or clay pipes. Fewkes²⁴⁰ records frag-

and the stem of another in Los Guanacos (fig. 112, *b*). It is made of a hard-baked, light brown-colored clay, containing a limited amount of

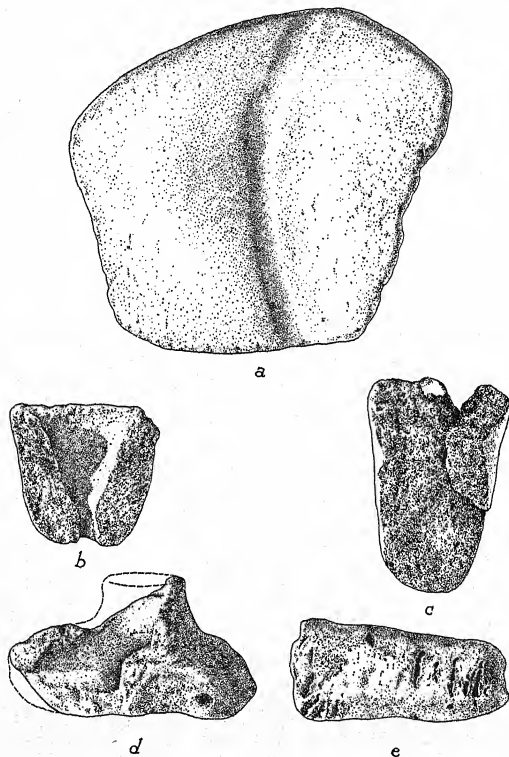


FIG. 74. Los Muertos. Pottery scraper (*a*), pipe fragment (*b*), and miscellaneous clay objects (*c-e*). Width of *a*, 4 inches.

ments of two pipes or cloud blowers from Casa Grande, both of clay and of the short tube variety. In all of the Hemenway explorations in the region only a half of a stubby conical pipe was found (fig. 74, *b*) in Los Muertos,

mica. The outer surface was not slipped, although it was textured with the stone polisher. The striations extend from the brim of the bowl towards the stem end. The maximum length of the pipe is only 1½ inches. The

²⁴⁰ Fewkes, 1912, pp. 135-136.

catalogue notes only that the pipe was found in Ruin XXV. A probable explanation for the dearth of clay and stone pipes here is the fact that they were replaced by the cane cigarettes, found in abundance not only in ritual caves (see pp. 194 herein), but also in certain rooms of the ruins.

Unidentifiable Objects: The fragmentary object in figure 74, *c* is a conical-shaped piece of baked clay, gray in color and $2\frac{1}{4}$ inches long. While in its form it bears some resemblance to pipes, there is no longitudinal perforation that could have served as the smoke vent. A small concave smoothed surface which remains on the widest portion would indicate the presence originally of a cupped end. The object lacks the punctate patterns reported on similar but much earlier specimens by Morris and Roberts.²⁴¹ The Los Muertos example is somewhat larger than any of those previously figured.

Figure 74, *d* is a fragment of an odd-shaped object formed somewhat like a hollow tube, closed at the ends and having an opening in the side bordered by a low neck. The material is baked clay, and the outer surface is rough. The bit of baked clay shown in figure 74, *e* has no particular significance but is nevertheless of interest because of an infant's tooth marks near the ends.

In the stone work of Los Muertos the emphasis was on the pecking and polishing of implements and sundry stone objects. On account of this, the ample stone collection is heavily overbalanced on the side of polished artifacts. Even though the art of chipping was well known, as shown by delicate projectile points, it was little used in the manufacture of other objects.

CHIPPED STONE IMPLEMENTS

Suitable raw materials for chipping in the lower Salt area are not very abundant. Chert of light gray color, and small concretions of

Clay Beads: Probably the smallest objects of clay made in this region were beads (fig. 75). Seventeen examples were found scattered through the bone fragments in a cremation jar from Ruin XIV. The method adopted in making the beads was essentially the same as that described elsewhere.²⁴² Briefly, this involved



FIG. 75. Los Muertos. Enlarged side (*a*, *b*) and end (*c*) views of clay beads. Diameter, $\frac{3}{16}$ inch.

the encasing of a grass stem in clay, thus making a long tube which was segmented while wet with shallow incisions; the tube was then dried, burned, and broken at the incisions to form the individual beads. Whether the bead was discoidal or cylindrical depended upon the length of the segments. The cylindrical type prevailed generally and all of the current examples are of this form. The apertures vary from $\frac{1}{32}$ to $\frac{1}{4}$ of an inch in diameter and the walls evidence the minute flutings of the grass stem around which the clay was molded. The jagged broken ends (fig. 75, *a*) were sometimes obliterated by grinding. Beads of this sort appear to be more characteristically southern than northern.²⁴³

OBJECTS OF STONE

chalcodony occur more frequently than other rocks, but these at best were obtained in small pieces only and could be worked into nothing larger than arrow points. Obsidian is clearly imported, although the exact source is not known.²⁴⁴ Unworked obsidian found in the sites always takes the form of nodules, seldom larger than walnuts (see pl. 67, *c*, *d*). Rock crystal and jasper were occasionally used.

Implements showing only percussion chipping are much less numerous than those showing a refined pressure flaking. The former are as crude as the latter are fine. There is a marked lack of specialization in the forms produced.

holtz, 1902, p. 444 illustrates a few which were found in Tubar graves near San Miguel, Chihuahua.

²⁴⁴ Perhaps the nearest source was an obsidian quarry not far from Superior.

²⁴¹ Morris, 1927, pp. 156-158; Roberts, 1929, pp. 125-126.

²⁴² Haury, 1931, p. 84.

²⁴³ I have seen some from the Tonto Basin, and Lum-

Knives: Most of these are nothing more than bulky fortuitous flakes (pl. 31, *a, b*) which could be readily used for most cutting purposes. The cutting edges were not retouched but usually show the irregular chipping resulting from use. There is a single quartzite blade, $2\frac{1}{2}$ inches long, struck from a core (pl. 31, *c*) and a lone discoidal tool of diorite chipped on one side only (pl. 31, *d*). Numerous spalls struck from diorite water-worn boulders were undoubtedly also used as cutting tools. These vary in form from nearly round to long examples, as shown in plate 31, *e, f, g*, and in size from $1\frac{1}{2}$ to 5 inches in length. They grade into a similar but larger tool usually called a hoe. Aside from the initial blow, required to detach the flakes from the parent mass, they show no further workmanship.

Picks: The large, battered tool in plate 32, *e*, of greenish schist, could have had other uses than that suggested by the name. The worn end shows clearly that it was used for bruising or crushing. It is a familiar type of implement in southern Arizona and northern Mexico. Sometime during its use a thin piece split off at one end (pl. 32, *f*), which was then made into a rough flaked tool resembling in shape the stone from which it came. By a strange coincidence, the Expedition found both pieces.

Club Heads: The two blades shown in plate 32, *d, g* were probably hafted to a wooden handle. The smaller example was crudely broken out of a diorite spall, the chipping being applied to both sides. The material of the larger blade is andesite. The points of both tools are blunt, from manufacture rather than from use. Similar tools are occasionally found in the ruins through the Tonto Basin and on to the east up Salt River.

Blades: The first of these (pl. 32, *a*) is a piece of felsite $\frac{1}{4}$ of an inch thick and $5\frac{1}{4}$ inches long. The flake scars are confined to the edge as the material was too thin and of too poor a quality to permit all-over chipping. The object may be a copy of the more finely chipped blades which follow, but it also has analogies in the Mimbres drainage.²⁴⁵ Plate 32, *b* is the point half of a skillfully worked blade of a very dark chert. The third example, also

fragmentary (pl. 32, *c*), is the basal part of a large-stemmed point or possibly a knife. It was found with burial 99 in Ruin III.

Projectile Points: The excellency of workmanship of which the occupants of Los Muertos were capable is shown on their arrow points. In thinness of blade and fineness of the retouching these are second to none. The common materials used were chert from white to dark gray in color, chalcedony, obsidian, and rock crystal. There is but a single point of the latter material in the collection of fifty-six examples, while twenty per cent are of obsidian, thirty per cent are of chalcedony and the remaining are of chert. The records do not show under what circumstances the points were found. Although the collection is not very large, several well-defined types can be distinguished, all adhering more or less to a single broad pattern. The characteristics which will fit nearly all specimens are: a triangular outline long in proportion to the width, very thin blade, broadest dimension reached at the base whether stemmed or not, and the notches are almost invariably at right angles to the long axis of the points.

The classification follows:

A. With stems		33
1. Expanding stem, widest at base		30
a. Very small notches far from base		13
b. Medium notches near base		8
c. Narrow deep notches very near base		5
d. Broad deep notches and deep basal notch		4
2. Stem narrower than shoulder		3
B. Without stems		23
1. Plain triangular		14
a. Slightly concave base		12
b. Deeply notched base		2
2. Broad base with deeply serrated edges		9
a. Straight or slightly convex base		6
b. Concave or notched base		3
Total		56

POINTS WITH STEMS: Nearly all the arrow points in this group, which is the most numerous, have expanding stems, i.e., the greatest width of the specimen is reached at the base

²⁴⁵ Cosgrove, 1932, pl. 44, *a, b, c*.

proper. Several variations may be noted. Most numerous and very characteristic of the area is a long, thin point with very shallow notches placed far from the base (pl. 35, *a-e*). The position of the notches, nothing more than nicks, is normally from one-third to one-half the distance from base to tip. This necessitated a very deep notch in the arrow foreshaft if the projectile point was to be properly set. Undoubtedly this accounts for the fact that the stems, and the blades as well, on this type are extremely thin. The base shows varying degrees of concavity but is rarely straight, and the edges are most frequently convex from notch to tip, the greatest convexity occurring immediately below the point itself. The mean length of these points is one inch and the range is from $\frac{1}{2}$ to $1\frac{1}{2}$ inches. In the shorter examples (pl. 35, *d, e*) the width-length ratio necessarily underwent changes. Curiously, none of the thirteen specimens in this class show the serrated edge treatment.

While the points in the preceding categories were made chiefly of gray chert and chalcedony, those of the next variety (pl. 35, *f-i*) are with one exception made of obsidian. This, as well as the fact that the type is shorter and broader on the whole, serves further to distinguish them from the others. The notches are medium as to depth and width in relation with the other notched specimens, and they are usually placed about one-quarter of the way to the tip. The workmanship on these is inferior, shown in the poorer quality of pressure flaking and in the greater asymmetry in outline. The bases are slightly concave and the lengths vary only from $\frac{3}{8}$ to $1\frac{1}{8}$ inches.

The four arrow points with very broad lateral notches and a third notch in the base (pl. 35, *j, k*) are from $\frac{3}{8}$ to $1\frac{1}{8}$ inches long. The notches are placed about one-quarter the distance between base to point, and in three examples, they are not directly opposite each other. Because of the depth and breadth of the notches, the neck is very slender. The deep basal notch was generally not extended from shoulder to shoulder. By this means, the foreshaft, even with a relatively shallow notch, could be brought down on the blade further than on a point with a flat or shallowly concave base.

The arrow points with deep narrow notches near the base can be further divided into two subtypes on the basis of length and other minor characters. Three specimens are long, averaging about $1\frac{1}{8}$ inches. They have true and straight edges and a flat base (pl. 35, *l, m*). The latter is finely serrated on both edges from shoulder to tip. The two short examples, not exceeding 1 inch in length, have strongly convex edges and moderately concave bases (pl. 35, *p*). The notches in both forms are at right angles to the long axis, extend about one-third of the way in from the edge to make a narrow neck.

Each of the three points with stems narrower than the shoulders represents a distinctive form. The first (pl. 35, *n*) is the longest and bulkiest specimen of the lot. The notches are very shallow and the edges are crudely serrated.

The second example (pl. 35, *o*) found on the surface is very slender, $1\frac{1}{8}$ inches long and composed of a peculiar gray material frequently found in early Hohokam sites. The notches are directed at an angle towards the center of the point and in their making, a small stem with convex base was produced. The edges are finely serrated from shoulder to tip. This point compares favorably with several found in early Hohokam sites and probably dates from the Colonial Period.

The third of the narrow-stemmed points (pl. 35, *q*) is quite different than all others. The specimen is made of milky chalcedony and measures $1\frac{1}{4}$ inches in length by 1 inch in breadth across the shoulders. In form it is therefore very short and stubby; the edges are strongly convex and join in a blunt point. The notches are diagonal, and the base is convex.

POINTS WITHOUT STEMS: These are triangular in outline, the length being usually from four to five times greater than the maximum width at the base. The blades are very thin and the workmanship on these is at its best. The bases are generally slightly concave. Lengths range from $\frac{3}{8}$ to $1\frac{1}{4}$ inches, the average being about 1 inch. The edges are either straight (pl. 36, *a*), slightly convex especially near the tip (pl. 36, *b*), or concave (pl. 36, *c*). The edges of four points in this lot are finely ser-

rated, the treatment extending from tip to base (pl. 36, *d*). In this particular, the serrations of these points differ from those bearing deeply toothed edges, as described below. A subtype in this group, has, as is indicated in plate 36, *e*, a very deep triangular notch in the base and a marked drawing-in of the edges from the base upwards. The two points of this description are $1\frac{1}{8}$ and $1\frac{1}{4}$ inches long respectively.

Points of the second class under the main group, lacking in stems, are usually thicker through the blade than the preceding forms. This is probably due to the extreme length and narrowness that some of the specimens attained. The lengths range from $\frac{3}{4}$ to $1\frac{1}{4}$ inches, the average being well over 1 inch. The base is broad in proportion to the blade and either straight or slightly convex (pl. 36, *f-h*). A variation is based on a rather marked concavity in the base (pl. 36, *i*). Perhaps the most interesting feature of these is the toothed edges. The serrations are quite deep, evenly spaced, and usually matched to a certain extent with those of the opposite edge. This treatment extends only from the base to about midway towards the point where the teeth, having gradually become smaller, are lost. From this point on to the tip, the blade is very slender. The last pair of indentations next to the base undoubtedly served as a notch. It is worthy of note that this form of serrating was exceptionally common in points dating from the Sacaton Phase.²⁴⁶

Taken as a whole from the standpoint of weight, the Los Muertos points vary from 2 to 68 grains. The examples *d* and *e*, in plate 35, weigh about 5 grains each, while the heaviest is figured on the same plate (*n*). The average weight for all points is from 12 to 15 grains, about 5 grains lighter than the predominant Pecos point.²⁴⁷

Drills: Of the seven drills from Los Muertos, four are of chert, two of chalcedony, and one of jasper. All examples are of the very long and slender type, the lengths varying from $1\frac{3}{8}$ to $2\frac{3}{4}$ inches. The chipping, as compared with the finest of the arrow points is a little less surely done, and as a rule the drills have

a fuller cross section than arrow points and are hence better able to accomplish the work intended for them. Two forms of drills may be recognized: (a) without flange (pl. 36, *j, k*) and (b) with flange (pl. 36, *l, m*). There are five examples of the first type and two of the second.

PECKED AND POLISHED IMPLEMENTS

Metates and Manos: It is clear that only a small percentage of the metates and manos found by the Expedition were taken East with the collection and that a thorough analysis, consequently, cannot be made. But such as there are may be reviewed.

The materials for metates consist almost solely of vesicular lava with variable degrees of porousness. The advantage that lava had over more compact substances was the fact that the pores increased the grinding efficiency in supplying a rougher surface. As the trough became deeper from prolonged use, new pores were continually being opened which kept the stone constantly "sharp" and fit for use.

On the basis of form, two variations in metates may be noted, although both adhere to a common style. The first group includes the small metates, measuring only about 6 to 10 inches in greatest dimension. These, to judge from the few available specimens, lack the deep troughs which characterize the larger examples, but they have a low lip that may extend around two or even three sides of the stone (plate 33, *a*). Some are simply boulders with a moderately worn groove (pl. 33, *c*) and show no intentional shaping. It is probable that the elongated rubbing stones as illustrated in plate 38, *f-i* were used in metates of this kind, since the wear surface on these does not extend to the ends as it does on the manos which were used in deep troughed metates.

The second metate form is more characteristic (pl. 33, *b, d, e*). The average size is 18 inches long by 10 inches wide, and the original block of stone was about 8 inches high; the grinding surface is trough shaped, i.e., open at both ends, slightly concave on a longitudinal

²⁴⁶ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. LXXXV. Curiously enough, identical points occur in

the Fort Ancient Culture. Shetrone, 1930, fig. 106.

²⁴⁷ Kidder, 1932, p. 22.

axis, and nearly flat on a lateral axis. Varying degrees of shaping produced either metates with rounded ends and bottoms (fig. 76, *a*) or square ends and flat bottoms (fig. 76, *b*). This is the characteristic Hohokam form as against the usual unshaped trough metate of the Salado.

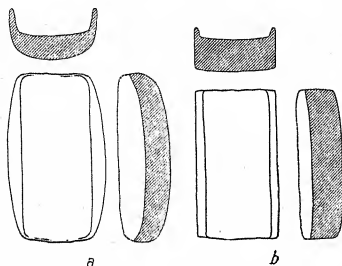


FIG. 76. Los Muertos. Outlines, longitudinal, and lateral sections of metates. Length of *b*, 18 inches.

The best information on the sequence of metate types in the Gila-Salt area has been produced at Snaketown²⁴⁸ and, curiously enough, a well-developed full troughed-shaped milling stone has been used by the Hohokam since well into the Pioneer Period. The Los Muertos metates reflect no significant differences over those in vogue during the Sedentary Period. It should be pointed out that nowhere north of the international border were metates ever produced showing so much attention to shaping as those of the Gila-Salt area. Metates from Chihuahua from late sites, as Casas Grandes, are equally as good, and as one proceeds on south into Mexico, the shaping of metates becomes ever more pronounced.

The Pueblo slab metate, as far as I know, was totally lacking in the Gila Basin, as was also the practice of setting metates into slab-lined bins.²⁴⁹ No mention is made of legged metates but Moorehead found a small one in a ruin near Phoenix, now in the Phillips Academy Museum, Andover, Massachusetts.

The large collection²⁵⁰ of manos clearly shows a lack of specialization in this tool. The materials run about 90 per cent vesicular lava, the remainder being granite, porphyry, and hard sandstone. The size range is as follows: maximum length, 8 $\frac{3}{4}$ inches, minimum length, 4 $\frac{3}{4}$ inches; average length, 6 $\frac{1}{2}$ inches, average width, 3 $\frac{1}{2}$ inches; average thickness, 1 $\frac{1}{4}$ inches. The shape is more or less rectangular, the ends being somewhat rounded, and the sides parallel or more often slightly convex. In bulk, the thin type prevails; there are three heavy manos which each measures 3 inches in thickness. Except in five instances, the manos were used only on one side. The wearing surface extends over on the ends of the stone as it runs in a groove and the ends meet the sides of the trough. Like metates, the manos were pecked into the desired shape. Only minor variations are to be noted in the treatment of the back. The predominating mano has a convex back, both longitudinally and laterally (fig. 77, *a*). There are less than a dozen examples in which the back is approximately flat and the sides are bevelled (fig. 77, *b*). A combination of these two forms is seen in the few heavy manos (fig. 77, *c*). Finger grips on the sides of the manos are totally lacking. A noteworthy example among the few which were worn on both sides (fig. 77, *d*) shows one flat wearing surface, the other has a low medial ridge running longitudinally.

Mortars and Pestles: How abundantly the mortar and pestle were found in the diggings at Los Muertos we do not know, but from a single mortar and several pestles contained in the collection, we do know that the trait was present. The mortar is a porous rounded block of lava having a conical pit with rounded bottom (pl. 34, *d*). The diameter of the pit at the top is about 5 $\frac{1}{2}$ inches and the depth about 5 inches. Pestles are of two types. First are those not artificially shaped. These consist of more or less cylindrical water-worn stones from 8 to 21 inches long which were put to use without modifications (pl. 34, *a*, *b*). Both ends are usually battered. The second type was far less

²⁴⁸ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 116 and fig. 46.

²⁴⁹ Bartlett, 1933, p. 23.

²⁵⁰ There is no way of knowing how many manos

were found by Cushing, nor how much selection was exercised in making the present collection of forty or fifty specimens.

common and represented from Los Muertos by two fragments only. These were carefully worked stones, usually of tough greenish crystalline rock, from 10 to 15 inches in length.

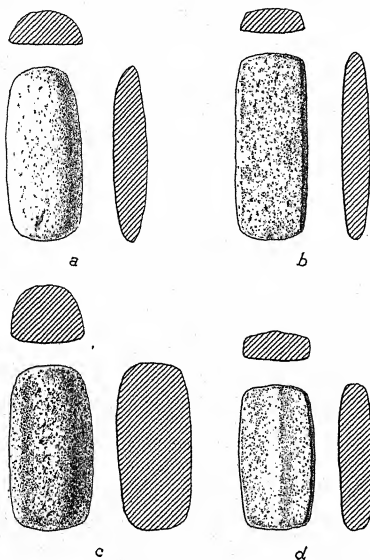


FIG. 77. Los Muertos. Outlines, longitudinal, and lateral sections of the chief mano types. Length of *b*, 8 inches.

As an element of culture, the boulder-type mortar, was present in the Gila Basin over a very long stretch of time,²⁵¹ and its use has undoubtedly been unbroken to the present day. It would appear that the rounded boulders in which the mortars usually occur would not offer a solid footing for carrying on pounding operations, but these may well have been set into the ground and held firm with a packing of clay as is done by the Pima and Papago. Bedrock mortars are sometimes found in the

southern half of the state but, because they are frequently not associated with a village site, they cannot be accurately dated.

Paint Mortars and Pestles: From the pigments recovered in Los Muertos, it is apparent that the native raw paint-producing minerals were first pulverized, then mixed with a body of some sort and molded into convenient form, thus to await ultimate use. Mortars probably used in breaking up the original mineral masses may be roughly grouped into two classes: flat, with shallow grinding basins, and cup-shaped types. The material in both is usually basaltic lava but may be a hard crystalline rock. The usual flat type consists of a water-worn pebble, one side of which has been worked down so as to make a shallow basin extending to the perimeter of the stone. These vary in width from about 2½ to 7 inches (pl. 37, *a*, *d*). A more specialized example has a convenient extension for a handle (pl. 37, *c*), which, with the grinding bowl, measures 6½ inches in length. The few cupped examples from Los Muertos are either unfinished (pl. 37, *e*) or broken. They are round, from 3 to 4 inches in diameter and 2 inches high on the average (pl. 37, *f*). The grinding pit is normally rounded. A small fragment of a carefully worked stone vessel shows that it had an elevated girdle running horizontally about the middle (fig. 78).

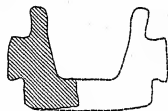


FIG. 78. Los Muertos. Section drawing of fragmentary paint mortar. Diameter, 3½ inches.

The last cited artifact probably represents the final stage of degeneration of a trait which was once highly characteristic of the Hohokam Culture, namely, the carved stone vessel which was at its maximum point of development during the Santa Cruz Phase.²⁵² Like the slate palettes, the stone vessel seems to have been dropped almost completely by Classic Period times.

²⁵¹ Gladwin, Haury, Sayles, and Gladwin, 1937, pls. LI, LII.

²⁵² Gladwin, Haury, Sayles, and Gladwin, 1937, pp.

108-109, fig. 45. It has not been demonstrated conclusively that these earlier types of carved stone vessels were used for grinding paints.

In the flat and shallow mortars, almost any small rounded stone could be used as a crusher, but in the deeper forms a true pestle was needed. There is only one object in the entire collection that could conceivably have been used as such. This is the plummet-shaped specimen of lava seen in plate 37, *b*. It is $3\frac{1}{4}$ inches in length and shows a minimum amount of wear on the large end.

Rubbing Stones: A host of varied duties which demanded the use of rubbing tools brought into action many stones of many forms. Some were used only once and then discarded, to judge from the meagerly worn surface; others were used extensively on one or more facets and rarely were shaped with the idea of attaining some symmetry in form. In material there is more uniformity than in shape. A hard fine-grained sandstone is the chief material, while a few each are of lava, diorite, and granite. Most stones, if not all, were selected from stream beds. The fine striations of the wear faces indicate that the strokes were in a forward and backward rather than in a rotary motion. This holds even in the discoidal forms in which the rotary motion might be expected.

The chief types may be noted. In the discoidal group (pl. 38, *a, b*) the stones range from 2 to about 5 inches in diameter. One has been very carefully pecked into form with flat face and a vertical edge (pl. 38, *c*). While most of them show no workmanship, a few have been channeled around the entire periphery, probably a means for improving the grip (pl. 38, *d, e*). The discoidal stones grade into oval and finally into longer shapes with rounded ends (pl. 38, *f-h*). Some of these converge on the mano, possibly in use as well as in form, but it is evident that most of them were not used in a troughed metate as the wearing surface does not extend around to the ends. Plate 38, *i* is more or less square as to section and has been used on four sides.

Polishing tools of a very light porous lava constitute a class in themselves, on the basis of material if not function. The lava in some cases verges on pumice and was obviously selected for its highly abrasive quality. These tools

occur as tablet-like blocks or flat rounded lumps (pl. 39). Wear facets are flat or convex. Example *a* carries white paint in the pores of one surface. For smoothing floors and walls, these tools would be admirably suited.

Abrasing Stones: The distinction that is drawn between rubbing stones and abrading stones rests on the fact that the former were held in the hand and used on a large resistant surface, while the latter, although probably held in the hand, were stationary and the object being fashioned was moved over them. The wear surfaces thus produced were usually not flat, but basin shaped or grooved.

The common abrading stone is a rectangular piece of tuff or schist from 3 to 8 inches long and usually not over 1 inch in thickness (pl. 40, *a, c, e*).

Reamers: The peculiar nature of marine shells, which were heavily relied upon as a material for ornament manufacture through the later Periods of the Hohokam Culture, lead to the development of an implement which appears to be restricted to northern Mexico (Trincheras) and southern Arizona (Hohokam). This was a reamer, made of quartz mica schist (pl. 40, *b, d*). It was used either as a reamer in boring out shell rings, etc., or as a file in wearing down the bands of bracelets, etc. At Snaketown it was a very common tool during the Sacaton Phase of the Sedentary Period.²⁰³

Hand Rasps: After a tool or other object was roughed out, it was sometimes desirable to further texture the surface by abrasion. This was done with implements, conveniently called rasps, which are generally smaller, chunkier, and more specialized as to form than the ordinary abrading stone. They vary from about 1 to 4 inches in length and fit the shape of the hand comfortably. The material in practically all specimens is vesicular lava. Flat-surfaced rasps take either hemispherical (pl. 41, *a*) or block forms (pl. 41, *b*). There are three specimens with trough-like surfaces running the length of the stone which impress one at first as being miniature metates (pl. 41, *c, d*). These would serve very well in shaving down wooden

²⁰³ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. XXXVIII.

shafts. Plate 41, *e, f* have basin- and furrow-shaped wearing surfaces respectively.

Hammerstones: These are too wanting in special features to require much description. The material is diorite almost without exception and the sizes run from 1 to 4 inches in diameter. The spherical type prevails, although the degree of roundness depends upon the extent of wear (pl. 42, *a, b*). The collection has a few discoidal hammerstones (pl. 42, *c*) and there are also several more or less cylindrical examples (pl. 42, *d, e*) used chiefly on the ends. There is but one pitted hammerstone, consisting of an irregular piece of lava with shallow finger holes (pl. 42, *f*). Grooved hammerstones and mauls were not especially made, but when axes were dulled beyond resharpening, or broken, they were made over into hammerstones, and could be used either with or without haft (pl. 42, *g-l*). Specimens *b-j* most clearly retain the axe characters. There are fifteen of these in the collection.

Axes: In the manufacture of axe heads in Los Muertos, and in the whole of the Gila-Salt region, stone working was at its peak. No other tools display the great care in shaping and finishing of an irregular piece of rock to an object of symmetry and utility. This, and the adherence to a uniform type, characterized by a long blade and a groove sunk into it on two sides and one edge, are the chief marks of recognition of the Gila axes. A description is useful only to point out variations in form, size, and minor details, some of which are of little significance as they were dependent upon the peculiarities of the raw material. Two axe types are present: (a) single-bitted, and (b) double-bitted.

SINGLE-BITTED AXES: These are most characteristic, there being about seventy examples in the collection. Unfinished axes supply a clear picture of the procedure of manufacture. Water-worn pebbles of suitable material, size, and often shape, were first selected from stream beds. Irregularities were obliterated and the raw stone was brought to an approximation of its ultimate shape by pecking with a hammerstone (pl. 43, *a-c*). Then the groove was worn by the same process (pl. 43, *d*). Grinding and polishing on a block of abrasive stone elim-

inated the dimpled surface caused by the previous pecking. The Los Muertans and their neighbors were not content to polish only the blade, which necessity called for, but in the majority of cases, the edges, the poll, and even the grooves were highly smoothed (pl. 43, *e*). Patches of original water-worn surfaces are seen only on the cruder second-rate axes which form a small group numerically. Secondary pecking, or the re-working of finished axes, was often resorted to when it became necessary to sharpen the blade, or, as in the axe shown in plate 43, *f*, where this means was used to further reduce the bulk of the blade. Here the cutting edge was still serviceable and it was preserved by pecking to within a fraction of an inch of it. It is evident that an intermediate tool was used — such as a sharp stone — near the cutting edge, for the line which separates polished and rough surface is far too sharp to be the work of a hammerstone.

The material of which axes were made is very uniform. With but a few exceptions it is a dark greenish crystalline rock of complex volcanic origin. Considering the fact that the raw pebbles of this stone had to be selected from among others representing a host of rock types, the uniformity is all the more surprising. This particular form of rock is very compact and so constituted mineralogically that it would not break readily under the repeated blows of the hammerstone when being fashioned, and that when completed, the cutting edge would stand considerable use. The stone is capable of taking a high polish, a fact which the axe makers appreciated and made full use of.

Single-bitted axes run through a wide range in sizes without any apparent segregation into groups. The smallest axe in the collection is $3\frac{1}{4}$ inches in length and the largest measures 10 inches. The average length is 7 inches. The graded series of normal axes illustrated in plate 44 emphasizes this point. Weight naturally depends on size and fullness. Extremes of heaviness vary from $8\frac{1}{2}$ ounces to 4 pounds 13 ounces; the average is slightly over 2 pounds.

As to form, the following points may be brought out. Axes with thin blades (pl. 45, *b*) seldom exceed a length of 6 inches. A cross section taken at either margin of the groove gives an ellipsoidal area, although occasion-

ally the sides are considerably flattened. The chunkier, heavier axes range over the entire size scale (pl. 46, *a*). In these the cross section is more oval and in a few cases approaches the circular. There is but one axe with a nearly rectangular section (pl. 46, *j*). In outline, the dominant axe reaches its greatest edge-to-edge width immediately below the groove, i.e., on the cutting edge side of it, whence it tapers somewhat to the blade end (pl. 45, *c*, *d*). In two cases, the axes are wedge shaped, increasing in width from poll to cutting edge. Thus, the latter is the widest part (pl. 45, *e*, *f*). This form, and its reverse as represented by one specimen, are undoubtedly predetermined by the shape of the pebble. Truly parallel-sided axes are lacking.

Most Southwestern axes manifest a total lack of interest in the shaping of the poll. While this is the case with a small per cent of Los Muertos examples, the majority of them show this part to have been intentionally fashioned along with the rest of the tool. In about sixty per cent of the axes the poll is rounded (pl. 45, *a*). The nearer the cross section of the blade approaches the circular the nearer the poll approaches the hemispherical. On the rest of the axes the poll has a definite face, frequently oval in form (pl. 45, *f*). That this was an intentional feature and not one brought about by hammering is shown by several specimens on which this face is highly polished. The axe with rectangular section previously mentioned has a face on the poll conforming to the section.

The groove, as intimated, extends but three-quarters the way around the blade, leaving one edge, designated as the inner edge, straight. In this one feature alone the Gila axes are to be distinguished from the full-grooved northern and spirally grooved Rio Grande types. There is not a single full-grooved specimen in the entire collection. When hafted, the straight or ungrooved inner edge was towards the end of the handle. The groove consists universally of a convex channel from $\frac{3}{4}$ to $1\frac{1}{2}$ inches in width and has an average of $\frac{3}{16}$ of an inch in depth. It is deepest where it passes over the outer edge. In about half of the examples, the groove has been partly or wholly polished. It

always bears a true right angle relation to the long axis of the blade. As regards placement, in a few instances, the groove is near the center of the blade (pl. 46, *a*) and very rarely as near to the poll as shown by specimen *b*. The normal position for the groove is about one-third the distance from poll to cutting edge (pl. 46, *c*).

The cutting edge, in side view, presents several variations. The common form is convex as in *b* (pl. 46) in which the arc created by the sharpened edge has a symmetrical relation to the long axis of the blade. In about five per cent of the axes the cutting edge is nearly straight (pl. 46, *i*). A few isolated examples have oblique convex edges (pl. 46, *e*, *f*) which are quite obviously unintentional as such edges would decrease the efficiency. In some cultures, as at Pecos, the cutting edge was purposely slanted from outer to inner edge in order to meet the obliquity of the hafting groove.²⁶⁴ Plate 46, *d* illustrates the extreme in the reduction of a broad cutting edge to a very narrow one. This is noted in two axes only. In the edge views of axes shown in the several plates the accuracy with which the cutting edge was centered is evident. But end-on, it rarely follows a straight vertical line. When the axe is held in this aspect with the inner edge down, the upper part of the cutting edge may be slightly to the right of the vertical axis, the lower part to the left. This is undoubtedly due to right-handedness on the part of the maker.

A few minor features remain to be mentioned. A shoulder, sometimes occurring along that margin of the groove nearest the cutting edge, or along both margins, is not seen on a single Los Muertos axe. One of the grooved hammerstones illustrated before (pl. 42, *b*), a made-over axe, does have this peculiarity. On the whole it is rare in Gila axes,²⁶⁵ except in those dating from the late Pioneer and early Colonial Periods. Quite as sporadic is a wedge channel occurring on the inner edge. Here again, this is noted only on a worn out axe later adapted for other purposes. In event of the loosening of the haft, a peg or wedge could be inserted into this groove and the head so made secure to the haft again. The collection has but one double-grooved axe (pl. 46, *g*).

²⁶⁴ Kidder, 1932, p. 52.

²⁶⁵ Gladwin, Haury, Sayles, and Gladwin, 1937, fig. 44.

The second groove, placed just below the first, is very shallow and the shift was probably made to achieve a better balance.

A unique and possibly significant specimen is the one shown in plate 46, *j*. In cross section it is more or less rectangular. This characteristic, in accentuated form, is seen in some of the axes from Chihuahua,²⁵⁶ and one has been illustrated from the Mimbres.²⁵⁷

Concerning the nature of the haft for three-quarter grooved axes there is no doubt. Many handles have been preserved in the debris of an aboriginal salt mine near Camp Verde, Arizona, and while these formerly were affixed to three-quarter grooved picks,²⁵⁸ there is no reason for suspecting that the same type was not also used for the axes. Proof is found in an actual mounted axe from a cliff ruin east of the Sierra Ancha.²⁵⁹ The handles consist of single pieces of wood, averaging about 1 inch in diameter, and 10 to 14 inches long when assembled. Near one end a part of the wood is cut away over an area corresponding to the length of the groove. This part of the haft is then bent and fitted into the groove forming the letter "J" and the short projecting end is bound to the main stem to hold the head secure.²⁶⁰

The excellent condition of the cutting edges in a very large portion of the Los Muertos axes is one of the interesting features about them. Many are not even nicked. This raises the question as to their use. Wood cutting is believed to have been their chief function. This may account for the perfectness of the blade, but as a handy tool about the house, the axe might be used temporarily for most anything. In some of these duties, the blades became battered and broken beyond hope of re-sharpening, when the tool was made over into a hammerstone. At least two axes were used in digging clay or semi-consolidated material of some kind which wore grooves into the cutting edge and kept it highly polished. The polls of nearly all axes show wear, either the denting from hitting hard objects, or the scratching and polishing from crushing softer substances.

Tempering ingredients for potter's clay and caliche for mixing with adobe were probably prepared with axes.

The catalogue of Los Muertos specimens tells very little concerning the occurrences of the axes in the site. No mention is made of axes having been found with burials. In plate 3a, showing a room in Ruin XVII, nine axes are to be seen on the wall and floor, all, presumably, having been uncovered in this room. Other instances of this sort are known.²⁶¹

Looking back, we find that the single-bitted axe was already present at the end of the Pioneer Period. It does not appear in large numbers until the Classic Period when workmanship and the characteristically long blade were at their best. A significant loss by this time was the shoulder bordering the groove.

DOUBLE-BITTED AXES: Ten double-edged axes were found in Los Muertos. Technologically, these pass through the same stages as the single-bitted axes (pl. 47) and the material is also principally the same as single-bitted axes, although one is made of pink rhyolite (pl. 48, *c*). Double-bitted axes are quite uniform as to size, the range being $3\frac{3}{4}$ to $6\frac{1}{4}$ inches (pl. 48, *a, b*). The average axe of this sort is about 5 inches long, 2 inches wide, and 1 inch thick. It weighs 1 pound as against the prevailing single-bitted 2-pound axe. The grooves are of the normal interrupted or $\frac{3}{4}$ type, but medially placed. They are shallow on the sides and deepest where they pass over the edge. The specimen illustrated in plate 48, *d* has a lug on each margin of the groove on the outer edge which not only deepens the groove but serves as a buffer to protect the haft at that point.

If the double-bitted axe is to be distinguished from the prevailing single-bitted type in function, as well as shape, a guess would designate them as war axes. Their lighter weight and perfect balance would make them serviceable weapons.

Historically, on the presence of double-bitted axes in Los Guanacos, one may say that they appear fairly early in the Gila Basin and

²⁵⁶ Lumholtz, 1902, p. 88 illustrates an axe of this type, but the poll is carved in the form of an animal head.

²⁵⁷ Fewkes, 1914, fig. 4.

²⁵⁸ Morris, 1928.

²⁵⁹ Haury, 1934a, p. 118.

²⁶⁰ For hafting methods of northern and northeastern areas see Harrington, 1927, pp. 127-131; Fewkes, 1911, pl. 20; Morris, 1919, fig. 9e; Kidder, 1932, fig. 23.

²⁶¹ Moorehead, 1906, p. 97, notes the finding of twenty-two axes in one room.

are to be considered, like the single-bitted axe, essentially a Hohokam tool. They were not found, however, at Snaketown.

Adzes: An adze is distinguished from a true axe in the relation which the blade bears to the haft. In an axe, the cutting edge runs on a line parallel with the haft, while the axis of the adze cutting edge is mounted at right angles to the haft. It has been pointed out in axes that the groove extends over two sides and one edge. By shifting this one-quarter of a turn, i.e., so that the groove cuts through one side and two edges, an axe could, without a great modification in shape, be directly made over into an adze. This change marks the significant difference between axe and adze from Los Muertos, although minor variations as well are to be noted.

There are seven adzes in the collection. In size, the range is very small, being only from 4 to 5½ inches, and, as a consequence, weights are also less than in the two varieties of axes already described. The average weight is 10 ounces while the extremes are about 5 and 15 ounces. The proportions, on the whole, are quite uniform as will be seen in plate 50. Cross sections are oval and in one case rectangular (pl. 49, *d*). Polls were intentionally rounded, and the grooves are quite shallow and not polished. The cutting edge is more often rounded than squared and never hollow ground as in the adzes of the New England Indians.²⁰² The chief interest lies in the relation of the cutting edge to the axis of the tool when viewed from the side.²⁰³ In four specimens the inner and outer edges are bi-convex and join at the approximate axis, thus duplicating an axe in this respect; and in three instances, the inner edge is practically straight and the outer edge is more strongly convex (compare pl. 49, *c, d*). The latter is the more common method of bit treatment in regions where adzes occur as characteristic tools. The lack of uniformity in this respect in the Gila adzes is not surprising, since

the tool as such was not widely known nor was there much demand for it, because wood-working was not one of the major interests. A duplicate of the slender adze reproduced in plate 49, *a* has been illustrated from Tennessee.²⁰⁴ The small example, *b*, was originally made as an adze, but, possibly because of the great thickness of the blade, it was found to be inefficient and therefore regrooved for an axe.

Heretofore, adzes from the Southwest have remained unreported in the literature.²⁰⁵ Their occurrence in three Gila Basin sites, viz., Los Muertos, Las Acequias, and Casa Grande is therefore of some interest. As all of these sites belong to the Classic Period, the adze is to be referred to that same horizon, but to account for its origin is a matter not so easily disposed of. Since the Gila adze is a late factor and the specimens originate from sites dually occupied by Hohokam and Pueblo groups, one might suspect them to have been introduced by the latter. But the absence of this tool in pure Salado Culture ruins does not permit such a conclusion. Either, then, the adze comes in as an outside influence or it developed locally. If the former alternative is true, the contact must have been south, as elsewhere in the immediate vicinity adzes are absent; even to the south they are not conspicuous,²⁰⁶ and in the Chihuahua complex, which shows affinities with the Gila Basin, adzes are lacking in the collections. The second alternative, that of local development, is by no means impossible because of the existing emphasis on axes as already shown. The translation of an axe into an adze was not a difficult matter and the adzes of bi-convex sides (pl. 49, *c, e*) would provide the expected transitional stage between the two extremes in blade types.

It is possible that, because adzes of this area so superficially resemble axes, they have gone unnoticed. Further interest needs to be centered on this tool to more thoroughly work out its Southwestern distribution in the light

²⁰² Willoughby, 1907.

²⁰³ The same terminology used for axes is applied here. Thus the sides of the axe—the largest surfaces—become the smallest in the adze, and the edges become the largest. The inner edge of the adze, as in axes, is ungrooved.

²⁰⁴ Fowke, 1896, fig. 40.

²⁰⁵ Fewkes, 1912, p. 124, pl. 53, illustrates adzes from Casa Grande but describes them as a variety of axe.

²⁰⁶ Sauer and Brand, 1932, pp. 32-33 report three-quarter grooved axes but no adzes from the west coast lowlands of Mexico. Lumholtz likewise (1912, plate opposite p. 144) illustrates grooved axes but no adzes from the Altar Valley.

of which its true relations can then be deduced.

Hoes:²⁸⁷ Certain flat thin stone blades, usually with one edge sharpened, have, through common usage, acquired the name hoe. While this calls to mind a tool with a long handle set at right angles to the cutting edge, there is no indication that these prehistoric hoes were ever hafted in this manner. Most of them were used directly in the hand, although there is some evidence that a form of haft was used.

Next to the slate palette and the three-quarter grooved axe, the hoe is probably the most typical of the stone artifacts in the Gila-Salt region. Barring manos or handstones in general, it certainly is the most frequent appearing item in the stone culture. The uses were undoubtedly varied. It is generally believed that the hoe was the chief tool used in the cultivation of fields and in the digging of the canals. But it is not to be doubted that they were also more generally employed wherever soil had to be moved, as in loosening clay for mortar and excavating graves.

Two broad types may be recognized, differing somewhat in form and especially in material. These are: (a) spalls struck from hard water-worn boulders obtained from stream channels (pl. 50) and (b) thin blades, chiefly of rhyolite and andesite, obtained from bed rock deposits (pl. 51, *et seq.*).

The difficulty of removing the large spalls from a boulder is well shown by the scars at the point of impact (pl. 50, *a*). After selecting a suitable side from which the large flake was to be struck, the hammering tool was brought down repeatedly on the same spot until the fracture was made. On some boulders a hole nearly $\frac{1}{2}$ of an inch deep was worn before the flake split off. The blade thus produced is usually of circular or oblong form showing a smooth convexity on the outer surface and an irregular roughened fracture surface (pl. 50, *a, b*). The sizes range from 3 to 8 inches in diameter. A spall could, without further modification, be adopted for a digging tool, but it is noteworthy that of the seventy-odd specimens which the Expedition brought back only twelve show wear. This may be accounted for in part by the fact that a relatively small per-

cent of the flakes thus derived would be suitable as tools, the bulk being rejects. Many of those in the collection would be cumbersome tools if put to an actual test. Only one hoe in the lot of this type evidences any actual sharpening by grinding (pl. 50, *c*). Plate 50, *d* and *e* are additional examples of this type, the first being oblong and worn at one end, the second, a circular spall with battered edge. None of these tools bear hafting notches and they appear to have been altogether an instrument for direct use in the hand.

The more typical hoes are those made of thin stone blades. The material selected for these, usually of volcanic origin, could be split out in very thin sheets varying from $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness. Deposits probably occur in some of the volcanic hills of the region. One is reported on Black Mesa bordering Salt River, about 60 miles east of Los Muertos. As the material was tough and hard, the pieces could be quickly made into hoes; but because of the extreme irregularity of outline of the stone plates and the lack of shaping other than the cutting edge, a great many odd forms resulted. A rigid classification of the ninety-six Los Muertos hoes is therefore not possible. Some, however, were dressed on all sides and the variations in shape can be taken account of. Usually the shaping was done by breaking and chipping the blade to the desired form. The cutting or working edge likewise, was sharpened by rough chipping, and not infrequently by grinding. In a few instances this was done from both sides and the edge was given a sharp and even finish. There is one case of sharpening by chipping after the grinding. Fine striations near the edge and parallel to it on some of the thinner blades indicate that they were used in cutting with a sawing motion, as well as the other uses assigned to them.

As suggested before, the form of many of these examples was predetermined by the shape the stone blade took when quarried. Hoes which illustrate this will be seen in plate 51. Except for the sharpening of the working edge, there has been no further alteration. The cutting edge of the first specimen (*a*) was sharpened by grinding, of the second (*b*) and the

²⁸⁷ Because these tools frequently show ground edges, as well as crude chipping, they are considered at this

point rather than under chipped implements proper.

third (*c*) mainly by chipping. The latter two also portray the chief differences in the form of the cutting edge, one being concave, and the other convex. Hoe *c*, $10\frac{1}{2}$ inches long, is the largest in the collection.

Next in order, from the standpoint of frequency, are hoes of a roughly rectangular outline (pl. 52, *a-c*). Here all irregularities of the original blade were removed in order to give the specimen this form, although it is evident that nearly rectangular pieces were often selected in the beginning. The cutting edge is typically straight or moderately convex. The size range is quite large, the extremes in length

ing the tool the hand falls to one side of the center and the tendency will then be in digging to draw the blade at a slight angle. Examples of this type measure about 5 to 10 inches in length. A hoe of somewhat different form but probably adopting the same idea is shown in plate 55, *c*.

Only about five per cent of the hoes from Los Muertos, excluding those made of spalls, are notched for hafting. Considerable variability is shown in this feature. Plate 54, *a* has but a single narrow notch running parallel with the base. Specimen *b* (and fig. 79) is a more common type with slight ears or projec-

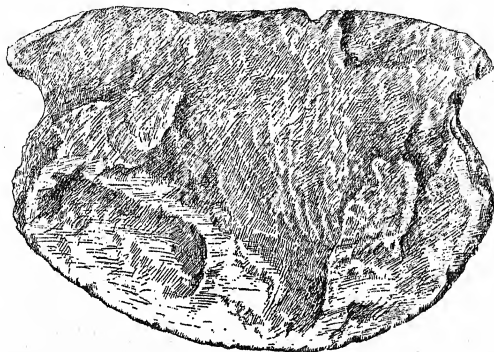


Fig. 79. Los Muertos. Notched hoe. Breadth, $6\frac{1}{4}$ inches.

being about $3\frac{1}{2}$ and 8 inches. There are a few hoes with strongly convex backs (pl. 52, *d*) which differ in this respect only from the preceding. Typologically, the next step is an oval hoe (pl. 53, *a*) with the entire perimeter worked but only one long edge sharpened for use. The whole convex edge of the lunate-shaped blade shown in plate 53, *b* was sharpened for use. The concave back is probably accidental so that the form is not a type. The long narrow blades to be seen in plate 55, *a, b* constitute a distinctive form. The working edges are nearly straight and the backs are convex, reaching a sort of hump near one end. This fits it very nicely for hand use, as in grasp-

tions that extend from the base. Hoe *c* literally has a stem, although some of it is broken away, and the effect is partly lost in the photograph. The stem is about 2 inches wide and not centrally placed.

On all foregoing types, the cutting edge has been parallel to the long axis of the stone blade from which the example was made. In a second but minor group of hoes the long axis is at right angles to the sharpened edge (pl. 56). Fewkes identifies these as shovels,²⁰⁸ believing that they were hafted in the manner of modern shovels.²⁰⁹ For this there is no good evidence. "Eared" examples, i.e., with lateral projection from the base, or those with slight notches

²⁰⁸ Fewkes, 1912, pl. 70.

²⁰⁹ Fewkes, 1912, fig. 39.

near the base, however, probably attest to some form of haft. None of the Los Muertos hoes of this type were notched. The only variants in shape to be noted are: (a) square base, slightly expanding towards cutting edge (pl. 56, a); (b) narrow cutting edge with expanding rounded base (pl. 56, b). The maximum dimension of these rarely exceeds 6 inches.

HAFTING: The question of hafting is somewhat complicated by the variations to be noted in the notchings, which are taken as evidence that the specimens were mounted in a wooden handle of some sort. The only concrete evidence on this point is a hoe with haft found in a cliff dwelling in a small lateral of Oak Creek on the Fort Apache Indian Reservation.²⁷⁰ The blade was securely fastened along the back between two halves of a split stick lashed with yucca. As the length of the stick did not exceed the length of the back by more than an inch, the haft was obviously not one by which the hoe could be swung; it was simply a means of increasing the thickness of the back in order to give a firmer and fuller grip for the hand. This is undoubtedly the method that prevailed generally when the blades were mounted. The reason for the notches and lateral projections in this form of hafting is perfectly clear, that is to say, that unless the binding material holding the wooden parts in place could be caught under notches of the projections, the sticks would loosen in time and the blade drop out. The hoe in figure 79 could readily be hafted with a handle of the type shown by Hough, but it is difficult to see just how this was accomplished with the single notched and stemmed forms.

DISTRIBUTION: The hoe as such is not a characteristic trait of the Pueblo Culture, although it came to be one of the typical tools of the Salado population during Pueblo IV times in the Globe-Roosevelt area and in the Gila and Salt region. Among the Hohokam, the hoe carries back into the Colonial Period,²⁷¹ but neither then nor later in the Sedentary Period was it common.²⁷² It is probably a significant fact that irrigation and the hoe persist more or less together, both historically and geograph-

ically. Whether it was essentially an excavating tool or a cultivating tool remains a question.

By Classic Period times the hoe was very abundant in the Gila Basin. Towards the west it seems to have diminished rapidly as a cultural trait and among the Colorado River tribes its place was taken by wooden agricultural

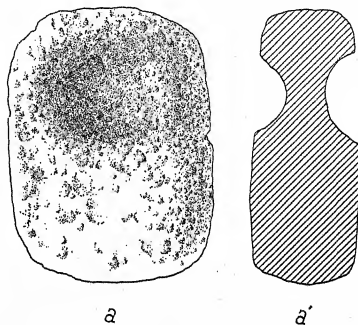


FIG. 80. Los Muertos. A pounder of lava. Length, 5 inches.

tools.²⁷³ Northwards, through the rugged mountain country flanking the Verde and New rivers and in the Flagstaff area, it becomes quite rare and of generalized form. Towards the east, it probably reached its maximum areal extension. In the Tonto Basin, in the ruins along Pinal Creek and to a certain extent in those east of the Gila, the hoe is a rather conspicuous element in typical Pueblo sites of late times. The use of notches and "ears" seems to have been greater here, broadly speaking, than in the Gila Basin itself. East of the Sierra Ancha, the hoe occurs sporadically, the hafted example already referred to and a painted specimen²⁷⁴ serving as notices of its presence. The painting of the hoe may suggest a ritual use, especially in a peripheral region where the utilitarian aspect was not so prominent a feature. Still farther east, in the Tularosa-Blue River region, a tool suggestive of the hoe is

²⁷⁰ Hough, 1930, pl. 7.

²⁷¹ Haury, 1932, pp. 98-99.

²⁷³ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 104.

²⁷⁴ Kroeber, 1925, p. 736.

²⁷⁵ Haury, 1934a, p. 120.

found, but its form is very generalized.²⁷⁵ Curiously, in the Mimbres, a specialized type of hoe is found, which, if identified correctly, has no equivalents in the Gila. These are long slender blades averaging about 10 inches, rounded or squared at one end and somewhat pointed on the other.²⁷⁶ In materials there is no marked difference. The form variation is undoubtedly purely one of local outgrowth. The problematical Pecos hoe is eastern in form and therefore does not fit into this complex.²⁷⁷ Concerning the southern distribution, the information is far from complete. Examples have been found in the vicinity of Tucson in red-

some fairly hard resistant substance as andesite, tuff, lava, or rhyolite. Stones were selected from stream beds and in most cases these remained unchanged except for the perforation near one end. Plate 57, *b* is of this type. This stone is 9 inches long, $6\frac{3}{4}$ inches wide, 5 inches thick, and weighs about 10 pounds. The bar of stone over the 2-inch perforation was reduced in diameter until it could be encircled with the fingers (fig. 81, *a'*).

The second unbroken specimen (pl. 57, *a*) indicates more attention in the matter of shaping. It is more or less discoidal, being $6\frac{1}{2}$ inches in diameter and $2\frac{1}{2}$ inches thick at the

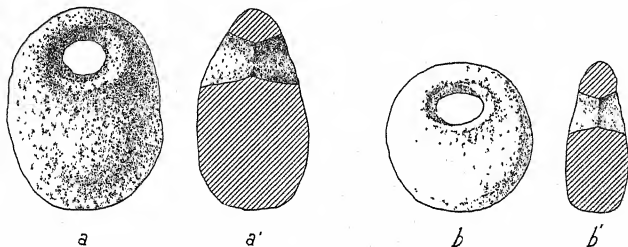


FIG. 81. Los Muertos. Outlines and sections of crushers. Length of *a*, 9 inches.

on-buff villages, but no data can be offered as to any farther southerly occurrences.

Pounder: This name is applied to a block of vesicular lava, shown in figure 80, which was pitted on opposite sides near one end to make a grip. It is assumed that the tool was used in the position as shown and does not represent a type of implement commonly used.

Crushers: The stones figured in plate 57 constitute a unique type of object in the Gila-Salt region. While they appear to have a generic relation to the pounder (above) differences are to be noted in size, form, and possibly in function. These so-called crushers do not occur in abundance, although they are known from several of the major sites.²⁷⁸ Two complete and two fragmentary examples were found in Los Muertos. Materials consist of

maximum point. Its weight is 4 pounds 5 ounces. As in the previous specimen, the handle was considerably thinned over the main body of the stone (fig. 81, *b'*). The edge, except over the handle, is flat. This is a unique feature as compared with others. Fewkes reports that these stones vary from a few inches to 2 feet in diameter,²⁷⁹ although the average size is about that of the specimens here illustrated.

Among the uses suggested for these objects, the most plausible is that of Moorehead, who believed they were used in preparing potter's clay.²⁸⁰ It is clear that the stones were designed to be used in the hand, as indicated by the grip. Yet an examination of the sides and bottoms for traces of wear produces negative evidence only. Pounding and rubbing against resistant

²⁷⁵ Hough, 1914, pl. 4, fig. 1, p. 20.

²⁷⁶ Nesbitt, 1931, pp. 80-82; Cosgrove, 1932, pp. 45-46.

²⁷⁷ Kidder, 1932, p. 58.

²⁷⁸ Moorehead, 1906, fig. 27, *d*; Fewkes, 1912, p. 129.

²⁷⁹ Fewkes, 1912, p. 129.

²⁸⁰ Moorehead, 1906, caption fig. 27; Cushing believed they were door weights.

material are therefore out of the question. The remaining suggestion is that they were used in a rocker motion as crushers. For this the rounded bottoms would be well adapted, and especially is this true of the discoidal type in plate 57, *a*. As the material is usually very coarse or full of pores, a considerable use of this kind would leave practically no traces.

As far as I am aware, crushers have no analogies in the Pueblo area but it is possible that affinities may exist with the Mexican-handled pounder which farther south in Costa Rica assumes a stirrup form.²⁸¹ Passing northward, stirrup pounders again make their appearance in the Pacific northwest and Alaska.²⁸² Of all these, the Gila Basin examples are the least specialized, and relationship, with the stirrup pounders of one or both of the areas mentioned, cannot be claimed owing to the incompleteness of our information. Locally, they must be assumed to be of Hohokam rather than Salado authorship.

Chisels: Slender pebbles, one end of which has been sharpened, are analogous in form and probably in use to chisels. These have few if any parallels elsewhere in the Southwest. The raw material was supplied by water courses in the form of thin pebbles from 2 to 6 inches long and composed of close-grained rocks. The process of manufacture was first to break away a portion of the stone from each side of the thinnest end so as to reduce the amount of material that had later to be ground down (pl. 58, *a*). The width of the sharpened edge averages about $\frac{1}{2}$ an inch and it is either straight or convex (pl. 58, *b*, *c*). In some cases the end opposite the sharpened edge was rounded and expanded, thus making a tool which fit conveniently into the hand. Example *d* (pl. 58) is grooved near the unsharpened edge. In the short chisels illustrated, the middle part of *e* (pl. 58) is reduced to provide a better finger grip, and the sharp edge is not at right angles to the axis of the tool; the second (pl. 58, *f*) example has a blunt cutting edge much as one finds in a cold chisel.

Implements of this kind would probably be most serviceable in splitting out pieces of wood for wooden paddles and for separating laminated rocks. They would probably not be

very efficient in the actual working of wood. In a few, the butt ends are somewhat battered.

Saw: The single tool thus labeled is illustrated in figure 82. It is a thin blade of schist $4\frac{1}{2}$ inches long, one edge of which has been toothed by making shallow cuttings. These fall opposite each other on the two faces, but there was no attempt to bring the teeth to a sharp point.

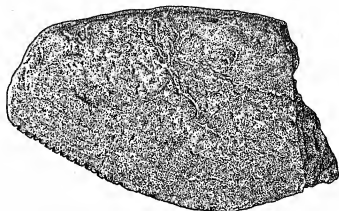


FIG. 82. Los Muertos. Fragment of schist notched for use as a saw. Length, $4\frac{1}{2}$ inches.

Pot Polishers: Like practically all pottery-bearing Southwestern sites, Los Muertos produced its share of pebbles, used in finishing the surfaces of earthen vessels before they were ready for firing. The polishers are recognized by the wear facets and a high polish, the results of extended use. The series shown in plate 59 gives a cross section of the types represented, including such materials as diorite, quartzite, and jasper. In a few instances, as in example, *d*, the facets are concave; usually, however, they are flat or slightly convex. Whether the long polisher (*a*) was used on pottery may be questioned as not all of the facets could be the result of this type of work.

Pottery Scraper: In addition to the single sherd scraper shown in figure 74, *a*, the collection has a stone tool which was probably used in the same capacity by Salado potters (pl. 59, *b*). The material is a grained feldspar.

Jar Stoppers: This name is applied to several rounded, more or less discoidal stones which have beveled sides (fig. 83, *a*). This bevel, it is believed, was made so that the stone could be snugly fitted into the mouth of a jar. The diameters are usually from about 4

²⁸¹ Hartman, 1901, pl. 68, no. 1, 1907, pl. XXII.

²⁸² Smith, 1899, fig. 13.

to 5 inches, comparable to the size of the orifices of the large storage jars. Figure 83, *b* is of granite and has a slight flange added at the top of the beveling. In addition, there is a shallow depression in the center of the upper surface. Clay stoppers analogous in size and form are not uncommon in cliff dwellings.

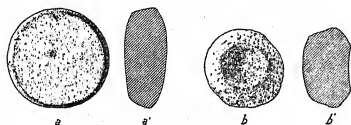


FIG. 83. Los Muertos. Outlines and sections of stone jar stoppers. Diameter of *a*, $5\frac{1}{4}$ inches.

Arrow Shaft Straighteners: These tools are far less abundant in Los Muertos and adjacent sites than one would expect. The collection contains only four of the small variety, and three large non-transportable grooved stones which have here been put in this category.

Three of the small straighteners are made of the customary talc schist and the fourth is of a fine-grained sandstone. The longest example (pl. 60, *a*) measures $4\frac{3}{4}$ by $2\frac{1}{2}$ inches and is nowhere more than $\frac{3}{4}$ of an inch thick. On one end of the upper surface the two corner panels were slightly sunken, each pitted in the center. The elevated intermediate area carries a series of light incisions. Below this and across the short dimension are four grooves, only one of which bears the marks of extensive use. The others were produced by cutting. The smoothest portions of the reverse side were deeply incised, possibly to afford a better grip to the slippery stone. Plate 60, *b* is irregular as to form and general arrangement. It is perforated obliquely from edge to back and has but two grooves. The smallest straightener (pl. 60, *c*) is but $2\frac{1}{2}$ inches in length and oval in outline. It also has four grooves, only one of which was much used, and an obliquely drilled suspension hole. The fourth example of sandstone is bulkier than the preceding and regularly shaped (pl. 60, *d*). There are five grooves, again only one of which was used.

This type of arrow straightener was cer-

tainly introduced into the Gila-Salt region by the Pueblo people. I have seen no specimens dating from pre-contact sites, but it is abundantly found in Pueblo IV ruins below the Mogollon Rim as, for example, Kinishba.²⁸³ Its late appearance in the Gila Basin is in accord with the conditions as recorded for Pecos.²⁸⁴ In the plurality of the grooves the Los Muertos specimens differ from those of Pecos and the Mimbres while the ridged type of Pecos is not represented here. The shallowly drilled holes in plate 60, *a* give to the specimen a zoö-morphic appearance. The low broad intermediate ridge or "nose" is seen more strongly accentuated on Pecos straighteners.²⁸⁵

Because the grooves in the large non-transportable stones are identical with those in the small straighteners, the identification is probably correct. There are three of these in the collection, all being made of naturally worn boulders of greenish stone (pl. 61). In the center of the upper surface of each there is a groove extending transverse to the long dimension of the stone. These vary from $1\frac{1}{2}$ to 2 inches in length, are $\frac{1}{4}$ of an inch in width, and not over $\frac{3}{16}$ of an inch in depth. In two instances they are very highly and uniformly polished, just as in the talc straighteners, while the groove in the third specimen was first begun by pecking and the subsequent wear was only sufficient to produce the faintest suggestion of a worn and polished channel. At either side of the central trough are broader and shallow grooves pecked into the rock. These evidence no wear, although in the largest example (pl. 61, *c*) they have been somewhat polished. The auxiliary unused grooves here recall those on the small specimens.

The inference is that bulky straighteners of this type would be used by an arrow maker in his house or at his customary place of work. Whether the difference in the two straightener types is to be referred to two cultural influences or to a variation in materials of which shafts were made is a matter of question. The boulder type straightener, as far as I know, has not been described from other areas. However, smaller and more carefully made straighteners resembling these occur in California.²⁸⁶

²⁸³ Cummings, 1940.

²⁸⁴ Kidder, 1932, p. 80.

²⁸⁵ Kidder, 1932, figs. 52, 53, 54.

²⁸⁶ Campbell, 1931, pl. 46, f. One example in the

Slate Palettes: These are thin rectangular tablets of schistose rock, usually having a raised border which is decorated with incised patterns. The depressed inner part appears to have been used for mixing pigments. Palettes of this sort were very prominent during the early Hohokam Period,²⁸⁷ but by the Classic Period it is clear that they had all but disappeared. Confirmation for this is had in the collection of these articles from Los Muertos. There is but one complete palette and fourteen fragments of others. Considering the extent of the excavations and the number of cremations found, this number is negligible in proportion to the usual returns in earlier sites. The only complete palette, now broken, was almost worn through in the center from continual use in mixing pigments thereon (pl. 62, *a*). A second tablet (pl. 62, *b*) was broken — the edge being subsequently straightened out and its use so extended. The miniature broken palettes (pl. 62, *c*, *d*) are also of interest. They measure about 1 by 2 inches and one, if not both, were pierced for suspension.

It seems safe to assume that the palettes used in Los Muertos originally had much earlier owners who probably lived in Los Guanacos or somewhere within the area covered by Los Muertos. The Los Muertans came by them in the same manner as the modern Pima have obtained theirs²⁸⁸ — through surface finds on the ruins. The many broken fragments, the worn out and the refinished palettes are pretty good evidence of this. Further, the type of ornamentation on examples *b* and *d* (pl. 62) i.e., notched borders, was the characteristic decoration during the Santa Cruz Phase.

Pointed Slate Objects: The two slate objects shown in plate 62, *e*, *f* are each $3\frac{1}{4}$ inches long. The first is evenly tapered from butt to point, while the second has convex sides. Both are grooved near the broad ends and specimen *e* has, in addition, a channel across the base and a short one on the side. As tools, these would be useless except if made from the softest of materials.

Peabody Museum Collection from Santa Barbara is 6 inches long, shaped somewhat like those from Los Muertos, and has three grooves.

²⁸⁷ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 121, *et seq.*

Stone Balls: The twenty-odd spheres of stone from Los Muertos are made of lava, granite, and tuff. All of the more perfect examples were worked into the round shape by pecking and a few of those of softer materials were also worn down on an abrasive surface; the irregular specimens, usually more or less egg-shaped, were apparently natural stones and for that reason are not included with those above. Diameters vary from 3 to $1\frac{1}{4}$ inches, while a 2-inch diameter is most frequently found (pl. 63, *d-b*).

Various uses have been assigned to these, such as gaming balls, heads of clubs, and ceremonial.²⁸⁹ Cushing evolved a further idea that they were bola stones, i.e., stones which had been encased, probably in leather, and fastened to strings. The free ends, of groups of these, were then bound together. The identification of the Los Muertos balls as bola stones was suggested in several instances where the spheres were found in groups, as they would naturally be after the perishable material would have decayed; further, the bola seemed all the more likely as certain figurines of animals (see pl. 82) were identified as guanacos, an animal allied with the llama and alpaca of South America where bolas were well known to the natives. There is, however, no current substantiation for the existence of such an animal in North America. Although it seems improbable that bolas were known to the peoples of the Southwest, it is not impossible, as the trait survives in the most marginal parts of the American continents. At one time the bola may have been used widely over the intermediate region which separates its historic occurrences and has since become a forgotten factor here. No certain evidences of the bola in dry deposits in the area in question have been found.

Undoubtedly, the best explanation of use for the round stones is that they were employed in kick-ball games. Russell makes it clear that among the Pima both wooden and stone balls were used, the modern examples being identical with those from the ruins.²⁹⁰ As a matter of

²⁸⁸ Russell, 1908, p. 112.

²⁸⁹ The catalogue records that several of these were found in a "priestly chamber with other sacred paraphernalia."

²⁹⁰ Russell, 1908, pp. 172-173.

fact, the ancient stone balls are preferred by the Pima, as their magical power for producing speed in a race was superior to those made more recently. The balls, both wood and stone, were usually covered with creosote gum. Smaller rounded stones were also used by women in a game which resembles the diversion now known to children as "jacks."²⁹¹

Stone Rings: The doughnut-shaped stones (pl. 63, *a-c*) are almost universally made of a very porous lava. The four complete and three fragmentary specimens from Los Muertos measure from 2 to 3½ inches in diameter and do not exceed 1 inch in thickness. The perforation was made by pecking from both sides, leaving in the middle of the sides a rather sharpened ridge. The outer edge is sometimes rounded but more often it is channeled as in a pulley wheel (pl. 63, *c*).

While the Pimas know these stones from surface finds about ruins, they themselves have no games in which such a ring is used and can suggest no other use than that they were head rings.²⁹² This is, of course, improbable. Cushing listed them as quoits, which, if correct, might account for numerous broken examples.

Although of rare occurrence in the Mimbres, at least one, with the grooved periphery, has been found in that area.²⁹³ As one goes northward from the Gila Basin, they diminish and ultimately disappear within a comparatively short distance. But to the west in southern California, perforated stones occur about as frequently as anywhere. These, it is believed, were fastened to the upper ends of digging sticks and served as combined weights and rests for the hand.²⁹⁴ Stone rings among the Hohokam were common only from the Sacaton Phase on²⁹⁵ and should be recognized as one of the traits of this culture.

Effigies: Through examples of stone animal effigies published by Moorehead²⁹⁶ and Fewkes,²⁹⁷ the Gila-Salt region has become known as one of the chief sources of objects of this kind. But for reasons not at all clear the entire excavation at Los Muertos did not pro-

duce a single complete animal effigy of stone. This is particularly difficult to account for, as they are chiefly found in the late ruins in the region. There are only two likely effigy fragments from Los Muertos (pl. 64, *a, b*). On the whole, the carvings are made of lava and the subject matter is chiefly animals native to the region, as the Gila monster, turtle, snake, mountain sheep, birds, and many other less easily identified forms. Some are really effigy mortars probably for grinding paints. Human representations are also known. In size, they vary from a few inches to a foot or more in length. Because many of the animals portrayed have no food value, they probably were not strictly hunting fetiches as commonly used by the Zuñi,²⁹⁸ but Fewkes notes that those described by him from Casa Grande were found in an intra-mural shrine.²⁹⁹

"Medicine" Stones: These are usually made of porous lava and the shapes may vary. Cylindrical pieces with rounded ends and grooves near one extremity are the most common (pl. 64, *c, d*). The usual length is about 2 or 3 inches. One of the Los Muertos examples was prepared for suspension by drilling two converging holes into the body near the groove. In more pointed or crescentic forms

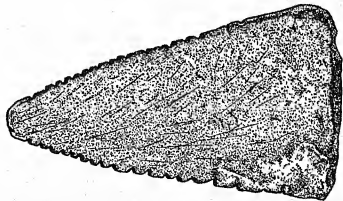


Fig. 84. Los Muertos. Schist blade with notched edges. Length, 3½ inches.

(pl. 64, *e, f*) the groove is shifted to the middle. Objects of this sort are very common from Hohokam sites of the Colonial Period.

Stone Point: This broken piece is a thin blade of schist worked into a point (fig. 84).

²⁹¹ Russell, 1908, p. 179.

²⁹² Russell, 1908, p. 181.

²⁹³ Cosgrove, 1932, pp. 54-55.

²⁹⁴ For further examples from the Salt see Moorehead, 1906, figs. 27 and 29.

²⁹⁵ Gladwin, Hauray, Sayles, and Gladwin, 1937, pl. LXXXII.

²⁹⁶ Moorehead, 1906, figs. 31, 33-35, 37, and 43.

²⁹⁷ Fewkes, 1912, pl. 47, 48; fig. 21.

²⁹⁸ Cushing, 1883.

²⁹⁹ Fewkes, 1912, p. 121.

The edges are serrated by notching. As the material is much too soft to have formed a useful tool, the object may represent an imitation of a large chipped blade.

Discs: Most of the stone discs from Los Muertos are undoubtedly comparable to the pottery discs as to use. The material is chiefly very thin slate or schistose rock and the diameters average $1\frac{1}{2}$ inches (pl. 65, *a*). Several discs of different material, however, are suggestive of having served a special purpose. Two of these are of gypsum, $\frac{3}{8}$ and $\frac{1}{2}$ inches in diameter respectively (pl. 65, *b, c*). They are proportionately thicker than the larger discs and display far more care in manufacture. The possible use is as parts in inlay compositions with shell and turquoise.

Spindle Whorls: There are eleven perforated stone discs varying from $1\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter, probably used as whorls on spindle shafts. Two of these are of buff-colored argillaceous stone (pl. 65, *e*) while the rest are of schist and slate (pl. 65, *f-h*). The objects are noticeably thinned from the center to the edge. Judging purely from the numbers contained in the collection, the clay whorls of the specialized and discoidal potsherd types were more in favor than stone whorls.³⁰⁰ This condition is practically reversed in the Pueblo IV ruins of the Salado Culture to the northeast, where the specialized clay whorl is nearly absent and the stone disc is considerably more common, although the clay discs are also present.

Pendants: These can be grouped into two classes: (a) geometric and (b) effigy. Geometric pendants of stone other than turquoise are quite large and crude. They run from about 1 to $2\frac{1}{2}$ inches in greatest length or breadth. The material is chiefly schist. In plate 66 the typical shapes are illustrated: discoidal (*a*), oval (*b*), pear-shaped (*c*), rectangular (*d, e*), and triangular (*f*). The last named is made of a thin plate of selenite. The perforation in this and a second triangular example

is made so that the apex hangs down. Pendants of turquoise and chrysocola are, on the whole, much smaller, the largest being $\frac{3}{4}$ of an inch long and the smallest $\frac{1}{16}$. A typical series is given in plate 66, *g-l*.

Effigy pendants can be further subdivided into those carved in profile and those conventionally worked in the full round.

The two profile pendants, both representing birds, consist of thin plates of schist. The first one (fig. 85, *a*), while crude and broken, is of interest because of the manner in which the feet are represented by scratches on the body;³⁰¹ the second example (fig. 85, *b*) has a wing spread of $2\frac{1}{2}$ inches, only a trifle less than the first, and is much finer in carving. Scratches on the wings and tail carry the idea of feathers. Both were suspended from a perforation in the head. This was a standard type of pendant as early as the Santa Cruz Phase.³⁰²

Pendants in the full round are represented by three birds (fig. 85, *c-e*). All of these are made of steatite, ranging in color from gray to grayish green. The scheme of portraying the bird in all cases is the same. Eyes are not indicated, but the bill is clearly marked, wings are folded, and the tail is differentiated from the body. Incisings accentuate the plumage. In figure 85, *c* the space between the wings was excised so that they rise above the surface of the back. Frequently the wings are distinguished on the back by incising an *x*, as in figure 85, *d, e*. The perforations pass low and laterally through the body causing the pendant to hang more or less vertically, i.e., with its head up when suspended on a string.

Bird pendants of this sort are by no means confined to the Gila Basin.³⁰³ They vary in degree of detail in carving from the merest outline form to very lifelike figures, sometimes inlaid with turquoise, and in materials the list includes lava, turquoise, hematite, steatite, serpentine, clay, and wood.³⁰⁴ Their territorial range is large but they are copied after a common pattern. Bird effigies of essentially the

³⁰⁰ Fewkes, 1912, p. 129, comments on the rarity of these at Casa Grande.

³⁰¹ Mimbres painted birds sometimes show this same character. Cosgrove, 1932, pl. 211, *e*.

³⁰² Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CVII.

³⁰³ For other examples see Moorehead, 1906, fig. 46.

³⁰⁴ Judd, 1926, pl. 46, *o*; Roberts, 1930, pl. 53, *a*; Pepper, 1905, pl. XX, *b*, 1920, fig. 50; Kidder, 1932, fig. 107; Bartlett, 1932, fig. 1; Nesbitt, 1931, pl. 41, *c*; Cosgrove, 1932, pl. 57, *b*; pl. 74, *r*; Hough, 1914, fig. 43, *b*; Fewkes, 1904, fig. 85, 1927, fig. 217, *b* and *c*.

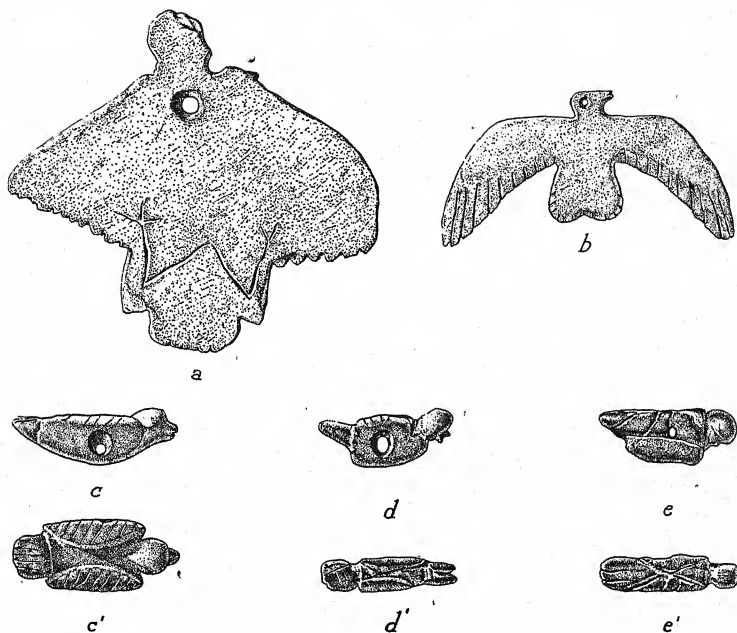


FIG. 85. Los Muertos. Bird pendants of schist (*a, b*) and steatite (*c-e*). Width of *b*, $2\frac{1}{4}$ inches.

same type appear certainly as early as Pueblo II³⁰⁵ and carry through to modern times.³⁰⁶ While birds were abundantly represented in the shell carvings of the early Hohokam, these being frequently associated with the rattle-snake or representing pelicans, the stone carved type as just described for Los Muertos seems to be an importation of the Pueblo people.

Bead Rasp: The small tabular piece of tuff, shown in figure 86, was probably used to make beads. The single groove across the center is $\frac{1}{4}$ of an inch in width, which is but slightly larger than the average diameter of beads. It is believed that drilled rectangular bead blanks, whether stone or shell, were strung and drawn

back and forth through the groove until a uniform roundness had been attained.

Beads: The chief sources for beads in Los Muertos were the burials and the cremations; but considering the number of graves and cinerary urns uncovered, the collection is very small. Discoidal and cylindrical types are represented, beads of the former being by far the most numerous.

The original properties of discoidal beads found in crematory jars have been so extensively changed that little can be said of the materials. Unaltered beads are either red or black, and composed, apparently of ferruginous shales and argillaceous rocks. These aver-

³⁰⁵ Bartlett, 1932, pp. 315-319.

³⁰⁶ Cushing, 1883, pl. VIII.

age slightly under $\frac{1}{8}$ of an inch in diameter and sometimes reach very small proportions. In addition there are a few turquoise beads, which, on the whole, are less perfectly rounded and run to larger sizes.

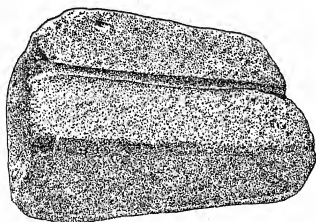


FIG. 86. Los Muertos. Bead rasp of tuff. Length, 2 inches.

Three of the five cylindrical beads are of steatite and two are of a dark red material which resembles pipestone. These are from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in length and average $\frac{3}{16}$ of an inch in diameter. The steatite beads have a beautiful green color⁸⁰⁷ and, along with similar examples sometimes found in ruins of southern Arizona, came from a common but unidentified source. An analysis of the so-called pipestone has not been made but all superficial characters are identical with those of pipestone.

Miscellaneous Ornaments: Objects which are not classifiable under the preceding headings can be briefly enumerated as follows: figure 87, *a* is a rectangular piece of red, grained stone, measuring $\frac{1}{2}$ by $\frac{1}{4}$ of an inch. While it may have been used as inlay material, the edges are not bevelled in the characteristic manner. The squared piece of "pipestone" in figure 87, *b* has a single perforation through the center and may have served as a bead or an ornament on a garment by fastening with a toggle. The sides are slightly bevelled towards the edges. Figure 87, *c* is of schist and possibly falls into the same category, although the four small holes would allow it to be attached by sewing. The small jar-shaped article of stone

illustrated in figure 87, *d*, is a curiosity. It is probably a concretion made over into its present form. Figure 87, *e* is a torpedo-shaped piece of white unidentified material, having a uniform $\frac{1}{4}$ -inch bore from end to end. Although the field catalogue lists this specimen as a pipe, and it bears superficial resemblance to tubular pipes from Pecos,⁸⁰⁸ I doubt if the identification is correct. The undifferentiated bore is somewhat smaller than in the average tubular pipe and there is no evidence whatever of ash or blacking from use. To class it as an ornament is more plausible.

Turquoise Mosaic Inlay: Although some of the finest turquoise incrustation from the Southwest has come from Casa Grande⁸⁰⁹ and other sites of the area, Los Muertos produced no such remarkable pieces. There are, as a matter of fact, only the tiny fragments of shaped turquoise as evidence of mosaic objects in the ruin.³¹⁰ These came from disintegrated assemblages encountered in Ruins III and XIII. The foundation material in one case was shell, in the other it was not determined.

Actual inlay is less abundant than incrustation or overlay in the Southwest. Again the chief substance was turquoise. This was sometimes augmented with bits of reddish-colored shell and pigments, as in several attractive inlaid shell objects from Los Muertos (see p. 156).

UNWORKED STONE

Fetishes: This term is used to cover a variety of natural objects deemed interesting enough to pick up. Some of these may have served as personal amulets or were included among other things in the kits of priests. The collection includes asbestos, quartz crystals (pl. 67, *a, b*), obsidian nodules (pl. 67, *c, d*), chalcodonic concretions (pl. 67, *e-b*) which occur in certain volcanic formations, calcite and siliceous concretions (pl. 67, *i-k*), and a large number of water-worn banded pebbles (pl. 67, *l, m*). These vary from about 2 to 10 inches in size and consist of materials of dif-

⁸⁰⁷ This material is sometimes mistaken for jade, or jadeite, but after an actual analysis by Dr. Charles Palache of the Division of Geology, Harvard University, it proves to be an uncommonly brilliant steatite.

⁸⁰⁸ Kidder, 1932, pp. 83-85.

⁸⁰⁹ Pinkley, 1931, pp. 21-22.

³¹⁰ The much publicized turquoise incrustated frog of the Hemenway Collection is a restoration and not an original specimen.

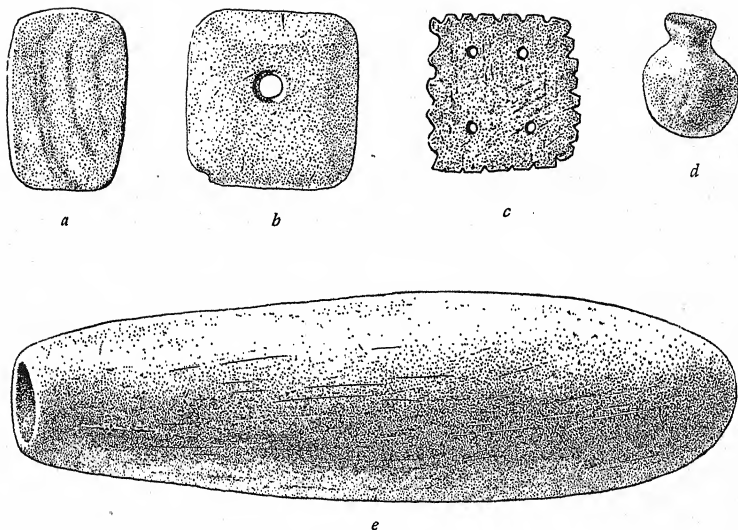


FIG. 87. Los Muertos. Miscellaneous stone objects. Length of *e*, $3\frac{3}{4}$ inches.

ferential hardness and color, eroded into odd shapes. There are also a few lumps of weathered conglomerate. Cushing reports that these were usually found associated with altar remains in the plazas of the house units.³¹¹

Pigments: These consist wholly of mineral substances, the chief ones being hematite, limonite, gypsum, and copper carbonate, producing the colors red, yellow, white, and green. In the case of the iron pigments, red and yellow,

the pulverized native minerals were added to clay, the compound then being molded into irregular cakes or stored in large *Cardium* and *Dosinia* shells. The most notable occurrence of pigments was in Room *j* of Ruin VII, where a whole series of paint-filled shells were placed along the base of a wall. Crayons (pl. 81, *e-g*) as found in Los Guanacos are not included in the pigment collection from Los Muertos.

OBJECTS OF SHELL

No other trade material was so much in demand or so well represented in Los Muertos as shell. Fewkes recognized long ago that on going south from the present Hopi pueblos shells increased and reached their greatest numbers in the ruins in the Gila-Salt region.³¹² This is not surprising as the Gila Valley was obviously the trade lane connecting interior

Arizona with the Gulf of California and with the Pacific itself.³¹³ Although the possibilities of coastal contacts of the northern Pueblos directly west are to be admitted, it is likely that most of the shells in the ruins of Arizona and western New Mexico were disseminated chiefly from the Gila route. We are in possession of no facts as to whether shells reached Los Muertos.

³¹¹ Cushing, 1890, p. 179.

³¹² Fewkes, 1896, pp. 360-367. ³¹³ Brand, 1938, p. 8.

to as a commodity of trade by passing from group to group, whether they were brought directly into the region by coastal tribes, or whether they were obtained by the Gila-Salt occupants on excursions to the ocean. In any case, the availableness of the material and an appreciation of its value as articles of ornament led to a considerable elaboration in its use. This dates from the very beginning of the Hohokam occupation as now known. Shell carving, for instance, during the Colonial and Sedentary Periods was never surpassed in realism or skill in later times. During the Classic Period, shell trade was still maintained in a high plane but there was some evident dropping off, evaluated on the basis of number of species and the number of traits present.³¹⁴

The following identifiable genera and species can be listed:

MARINE SHELLS

West coast and Gulf of California:

- Olivella* sp. Several hundred; used as whole shell beads.
- Nassarius tegula* Roe. Several hundred; used as whole shell beads.
- Glycymeris maculatus* Brod. About sixty; used as pendants, armlets, rings, frog carvings, and bases for overlay.
- Cardium elatum* Sby. About thirty-five; used as paint containers and for making cut shell pendants.
- Turritella tigrina*. Twenty-five; pendants.
- Comus* sp. Sixteen whole examples; used as tinklers and for making rings.
- Dosmia ponderosa* Gray. Fourteen specimens; used as paint containers, rarely in making armlets.
- Olivula hiatala* Gmel. Six; spires rubbed down for stringing.
- Cerithium stercus muscarum*. Five; used as whole shell pendants.
- Cerithiidea* sp. Four; used as whole shell beads.
- Columbella* sp. Four; used as whole shell beads.
- Vermus* sp. Four fragments; unworked. (Also Gulf of Mexico.)
- Strombus galeatus* Swain. One whole and several fragments; used as horns. (Also Gulf of Mexico.)
- Trivia solandri* Gray. Three; used as whole shell pendants.
- Codakia distinguenda*. Two; unworked; red portion possibly used in inlay.
- Donax gouldi*. Two; unworked.

Pecten excavatus Anton. Two fragments; used as whole shell pendants.

Melongena patula B. and S. One; used as horn.

Polinices lewissii Gld. One; used as scraper. (British Columbia to Santa Barbara Islands.)

Haliotis sp. A few fragments only; worked into pendants.

Spondylus sp. Disc beads and worked pieces only.

Avicula sp. One fragment. (Also Gulf of Mexico.)

Gulf of Mexico:

Pecten exasperatus. Seven; used as whole shell pendants.

FRESHWATER SHELLS

Unionidae sp. About a dozen fragments and cut pendants. (Probably east or northeast Texas.)

Anadonta sp. About a dozen unworked specimens. (Probably local.)

Physa sp. Not worked; these were caught in matted cotton fibres dug from old irrigation ditch.

LAND SHELLS

Helisoma sp. One; unworked. (Local.)

From the above it will be seen that the chief source for shells lies to the west. A few species are common to both the Gulf of Mexico and the Pacific and there is only one species which is confined to the Gulf waters. Marine shells found in Pecos show a far more equal division as regards these sources.³¹⁵ Since to the east, in Texas, marine shells of the varieties known become less and less, it appears that the trade route probably carried farther south into Chihuahua, where species from both oceans co-exist, and thence east to the Gulf. As the inflow of shell into the Middle Gila came up that river, there was little opportunity for Gulf shells to find their way westward, although they traveled northward up the Rio Grande. Pendants of freshwater clams, possibly from east or northeast Texas, add another angle to the trade possibilities, but as certain identification can only be made from whole shells, and these are lacking, this eastern contact cannot be absolutely established. It is not improbable that most of the Hohokam traits, which are gradually being recognized farther north, were transmitted incident to a far-flung barter in

³¹⁴ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 152.

³¹⁵ Kidder, 1932, p. 183.

shell via the Gila route. The northerly fading of shell is sound evidence of this. Such a contact could reasonably have existed from at least Pueblo I times on.

In the following classification of shell objects no effort has been made to include numbers of specimens because of the excess of fragments over whole specimens.^{81b}

- I. Unworked shell
- II. Worked shell
 - A. Utility objects
 1. Needles
 2. Scrapers
 - B. Ornaments
 1. Beads
 - Whole shell
 - Disc
 2. Pendants
 - Whole shell
 - Tinkler
 - Cut shell
 3. Bracelets
 4. Rings
 5. Geometric forms
 6. Painting and inlay
 - C. Ceremonial objects
 1. Trumpets

UNWORKED SHELL

Shells not worked consist mainly of those laid aside for future use as *Olivella*, *Nassarius*, and *Comus*, and a few of the less common forms as *Codakia* (pl. 68, f) and *Donax*. Nearly all of the larger shells, as *Cardium* and *Dosinia*, some reaching 6-inch diameters, were also not modified but they were nevertheless used, chiefly as containers for paint (pl. 68, a and b). Shells heavily worn from constant handling must also be mentioned. Four of these are *Glycymeris* shells (pl. 68, d, e), one of which (c) retains nearly all of the original color, and others are chiefly pieces of *Vermetus*, the calcareous casing secreted by a marine worm (pl. 68, g). These may have been included in medicine outfits, or carried in pouches as personal charms.

^{81b} In the field register pearls are listed but these prove, on examination, to be very small stone concretions.

WORKED SHELL

The tractableness of shell was undoubtedly the chief factor leading to the proliferation in the use of the material. It is of interest to note the methods employed in modifying and adapting it to the several purposes. The primary methods were grinding, cutting, breaking, and drilling. Grinding was the most used. Spires and beaks were thus eliminated so that individual shells could be strung as beads, and in the fabrication of rings and bracelets the superfluous parts were almost wholly done away with in this manner. The peculiar nature of shell led to the development of a specialized tool, the reamer (p. 129). Cutting was used chiefly in making the effigy pendants, but breaking, to judge from the wastage and specimens damaged in process, was common. Drilling was the chief means for perforating where this was not done by grinding. Beads and pendants of all sorts were thus fitted for stringing and for suspension. Perforation, however, was also accomplished by cutting, as in some *Comus* tinklers, and by breaking, as in the thin walls of *Nassarius* and sometimes *Olivella*. Secondary changes were made by carving or engraving, inlay, overlay (mosaic), and painting. These will be brought out more clearly later.

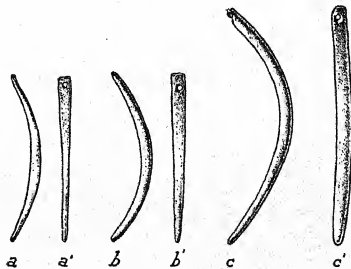


FIG. 88. Los Muertos. Shell needles. Length of c, 2¼ inches.

Utility Objects: NEEDLES: A division of worked shell objects into those which were solely utilitarian and those of pure ornament emphasizes the role played by shell in the Gila region. The former class is small indeed. Chief

of useful articles are needles, there being nine in the collection. These measure from $1\frac{1}{8}$ to $2\frac{1}{2}$ inches in length, are very slender and crescent shaped (fig. 88). From the broad end which has a minute eyehole the needles taper gradually to relatively fine points. It is clear that some of the instruments were made of bracelet fragments. While the curvature would have prevented any very fine sewing, the needles would be useful tools in making the coarser stitches usually evident on fabrics from dry deposits.



FIG. 89. Los Muertos. Shell scrapers. Length of *b*, 3 inches.

SCRAPERS: There are two shell objects which fall into this class. The first (fig. 89, *a*) is a univalve (*Polinices lewissi*) of which the lip served as the scraping edge. This shell is about 2 inches in diameter and with the spire eliminated fits the hand perfectly. The second example is a 3-inch piece of *Cardium elatum* from the thick portion near the beak (fig. 89, *b*). The convex edges are worn as in scrapers used in the making of pottery.



FIG. 90. Los Muertos. Shell disc beads showing size range and irregularity of section. Natural size.

Ornaments; BEADS: WHOLE SHELL: These consist chiefly of small univalves, occasionally of small bivalves. The shells of *Olivella* (pl. 69, *a-e*) from the Pacific coast were, as is usually the case, the most abundant.³¹⁷

The second chief type of univalve is the small rough-surfaced *Nassarius tegula* (pl. 69,

f-h). Those that found their way to the ruins average about $\frac{1}{4}$ inch in length. Stringing was made possible by breaking a small hole through the lip near the mouth. The spires were left intact. A slightly smaller but similar appearing shell, *Alectrion*, was used in the same way at Pecos³¹⁸ and to a greater degree to the south in the Mimbres³¹⁹ and Chihuahua.

Columbella (pl. 69, *i, j*) and *Trivia solandri* (pl. 69, *k, l*) were also used as whole shell beads, but they are very rare as compared with the preceding species. *Trivia*, lacking a spire and having deeply incurled lips, necessitated two perforations through the side walls.

Small individuals of the bivalve *Glycymeris*, measuring $\frac{1}{2}$ inch in diameter or less, were also strung as beads with a perforation through the beak (pl. 69, *m, n*). Singly, they appear as pendants, but strung together tightly their use was more like that of a bead.

There are in the collection about a dozen *Conus* shells with spires worn down but lacking other alterations (pl. 69, *o*). These, it seems, must also have been strung in the manner of the *Olivella*. The same is true of three *Olivella* shells (pl. 69, *p, q*), the latter being truncated at both ends. These would naturally make very bulky strings but too few have been found to believe that full strings of the kind were used.

DISC BEADS: These are quite variable both as to size and thickness. Diameters run from $\frac{3}{32}$ to $\frac{3}{8}$ of an inch, while the average is about $\frac{3}{16}$ inch; thicknesses vary from $\frac{1}{8}$ to less than $\frac{1}{32}$

of an inch (fig. 90). Perforations are consistently larger in shell than in stone beads. The largest disc beads are usually made of pinkish-colored shell, the smaller ones being white. On the dozen or so pink beads the faces are well smoothed, although an even thickness was not always attained. In the flatness of the faces

erts, 1931, p. 161). This condition does not obtain in the more southerly ruins.

³¹⁸ Kidder, 1932, p. 186.

³¹⁹ Cosgrove, 1932, p. 67.

³¹⁷ This applies especially to the Classic Hohokam-Pueblo IV ruins of the Gila-Salt region. In the north the *Olivella* was a favorite in Basketmaker times, but its use fell off during the later Pueblo horizons (Rob-

these differ from the average white shell bead with their strongly biconical perforations. In most cases no attempt has been made to reduce original irregularities. There are but two true saucer-shaped beads, i.e., concavo-convex in form, but being less than $\frac{1}{4}$ inch in diameter.

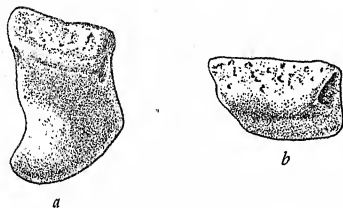


Fig. 91. Los Muertos. Irregular shell beads. Length of *a*, $\frac{1}{4}$ inch.

Beads of this type have been reported from Pecos³²⁰ and there is a string in Peabody Museum's Casas Grandes Collection.

Cylindrical and massive beads of shell are not represented. There are two irregular specimens of a type which is quite rare throughout the Pueblo area except in the Chihuahua Culture. These are usually from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long and made of the thick beak portion of an unidentified shell, often of a pinkish color. The first example calls to mind a claw (fig. 91, *a*); the second is a flattish piece drilled lengthwise (fig. 91, *b*). Although *Vermetus* (pl. 68, *g*), a tubular casing of a marine worm, would appear to be desirable bead material, it was but rarely used. This type was common at Snaketown, particularly during the Santa Cruz and Sacaton Phases³²¹ and from the few Los Muertos examples, it would look as though the type was on the road to extinction.

Shell beads were found with burial and cremation remains. Those with the latter are of a dark gray color since they passed through the fire. Taken as a whole, the most outstanding character of the Los Muertos shell disc beads is

the irregularity of the faces and the large biconical drill holes.

PENDANTS: WHOLE SHELL: Although both bivalves and univalves were used with little alteration as pendants, *Glycymeris* of the former type was favored (pl. 70, *a, b*). These ranged from a fraction to about 3 inches in diameter. They were suspended by means of a hole made into the umbo by grinding. Four shells in the collection have large holes in the back. Plate 70, *c-e* gives the stages in the process of making. The perforations average about $\frac{1}{4}$ inch in diameter and are not so perfectly rounded as in similar objects from Pecos.³²² There is also another difference; namely, that the back perforations in the Pecos shells seem to be made by drilling, while those of Los Muertos are made by rubbing down the back of the shell, leaving a flat area bordering the hole.

Other bivalve shells used as pendants are *Pecten exasperatus* (pl. 70, *f*), numbering seven individuals brought in from the Gulf of Mexico, and two fragments of *Pecten excavatus* from western waters (pl. 70, *g*). It is interesting to note here the presence of large numbers of *Pecten excavatus* in an early Hohokam site near Casa Grande³²³ but in later times they become scarce as the few individuals from Los Muertos show. Since the *Pecten* has large wings, making for a relatively long hinge line, these were usually reduced. The chief gastropod employed was *Turritella tigrina* of which there are about twenty-five examples. These were suspended from a hole near the mouth, so that the spire hung down (pl. 70, *b, i*). The individuals vary from about $1\frac{1}{2}$ to 4 inches in length. A variant was produced by rubbing down the shell on three sides thus exposing the spiral chamber between the dividing wall (pl. 70, *j*). *Cerithiidea* and *Cerithium* (pl. 70, *k, l*) suspended in the same manner as *Turritella*, were uncommon.

TINKLER PENDANTS:³²⁴ These consist solely of *Comus* shells from which the spires have been removed. The resultant cone is pierced near the apex either with a cut or bored perforation (pl. 70, *m-q*). The average length is about 1

³²⁰ Kidder, 1932, pp. 185-186.

³²¹ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXV, *d*.

³²² Kidder, 1932, pp. 189-190; see also Fewkes, 1904, p. 192; Fewkes, 1912, pl. 75, *d*.

³²³ Woodward, 1931, p. 19.

³²⁴ Kidder, 1932, pp. 190-192.

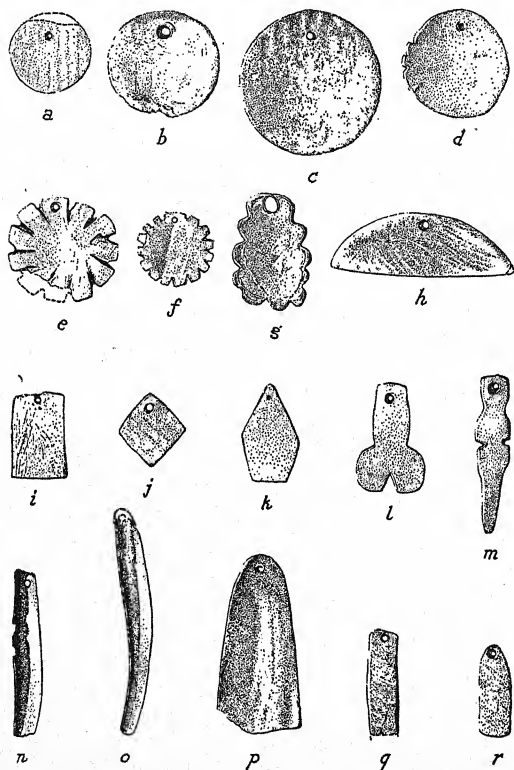


FIG. 92. Los Muertos. Cut shell pendants. Length of *b*, 1 1/4 inches.

inch and there are 50 in the Los Muertos Collection.

CUT SHELL PENDANTS: This class is by far the most interesting and characteristic of the Gila-Salt area. These were made mostly of the flattest portion of the thin uniform wall of *Cardium elatum*; in a few instances nacreous shell was used. In the purely geometric figures, discs

prevail (fig. 92, *a-c*). These vary from 1/2 to about 1 1/2 inches in diameter and are supplied with a single perforation near the edge. Further embellishment was sometimes added by notching the rim or making short incisions directed towards the center (fig. 92, *d-f*). Figure 92, *g* is a variant of the same, made of *Haliotis*. Although simple, this characteristic form has been recorded from other points in

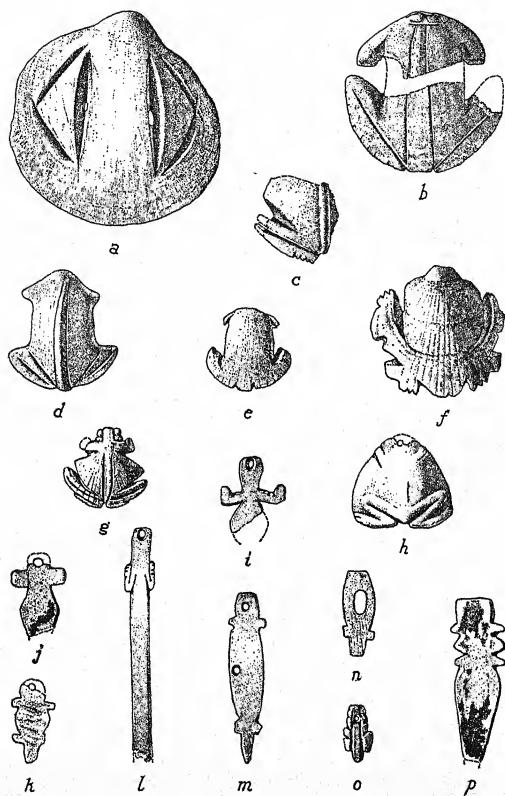


FIG. 93. Los Muertos. Shell carvings. Length of *l*, $2\frac{3}{4}$ inches.

the Southwest and from the Channel Islands off the California coast.³²⁵ The semi-lunar pendant illustrated in figure 92, *b* is the only one of its kind in the collection. There are also about half a dozen rectangular pendants (fig. 92, *i*), two of diamond shape (fig. 92, *j*), and one pentagonal pendant with unfinished string

hole (fig. 92, *k*). Specimens *l* and *m* are trending towards the animal pendants, although they cannot be certainly identified as such. The former has an analogy in shape with a lava "medicine" stone from Las Piedras (fig. 123, *l*). The long narrow pendants (fig. 92, *n-r*) differ from the preceding in form and material. They

³²⁵ Kidder, 1932, fig. 164, *f* and *b*; Cosgrove, 1932, pl.

70, *f* left (stone); Heye, 1921, pl. LXXX, *b*.

are all made of an unidentifiable species of the freshwater clam *Unionidae*, believed to have come from east or northeast Texas. The fact that pendants of this material run more or less true to type—a type which differs considerably from the others represented—and because no whole shells of this genus were found in Los Muertos, may mean that they were articles acquired through barter.

Shell carvings in life forms are even more abundant than the foregoing. Favorite subjects were reptiles—especially frogs—birds, and to a lesser extent mammals. Some of these are very realistically pictured, others verge on caricatures or have been so stylized as to be unrecognizable. The best workmanship and sense of proportion is seen in the frog carvings, of which there are seventeen, whole and fragmentary. In contrast with other pendants cut from pieces of suitable shell, the frogs were uniformly made of whole *Glycymeris* shells. These run from about $\frac{3}{4}$ to 2 inches in length. Figure 93, *a* illustrates one in the process of manufacture, where parts of the shell are being cut out to emphasize the difference of legs and body. The anatomical features stressed most often are the eyes, the backbone, and the rear legs which are folded in a realistic manner. Ordinarily these are shown merely by incising but occasionally relief is obtained by reducing the surrounding shell (fig. 93, *b-d*). The other extreme towards conventionalization is seen in figure 93, *e, f* where anatomical features are omitted but the idea is preserved in the outline. Figure 93, *g* is probably the most natural frog in the lot, while the outline of *b* is triangular with no cut-out parts. This converges on the type of frog carving found on bracelets where the available space was limited to this shape by the nature of the shell.³²⁰

Other reptilian forms (fig. 93, *i, j-p*) were nearly always carved from nearly flat pieces of *Cardium*. The identification of these is less sure than in the case of frogs as the distinguishing characteristics were never so carefully worked out.

³²⁰ For other notable frog representations see: Fewkes, 1904, pl. XLIV; Pepper, 1905, p. 192.

³²¹ Moorehead, 1906, fig. 47, second row, right, shows a clear case. Also Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXVI, *e*.

³²² Nesbitt, 1931, pl. 41, *i*.

Pendants of birds with outstretched wings are common (fig. 94, *a*). These vary from unmistakable birds³²⁷ to conventional figures which would hardly be recognizable without the true copies. Tail indentations and the typical headform may be entirely lost and there is often an exaggerated wing length as in figure 94, *d*. These pendants run from about 1 to 2 inches in length, the thread hole being in the head. Their distribution is by no means limited to the Middle Gila. Numerous examples have been found in Salado ruins, as Gila Pueblo, and a host of others in the Tonto Basin. In the Mimbres area typical forms turn up³²⁸ as well as abbreviated types which may be an expression of the same idea.³²⁹

On Santa Cruz Red-on-buff pottery there sometimes occurs a design portraying a bird standing on and pecking at a rattlesnake. This motive is portrayed in pendant *e*, figure 94. The snake is not characterized except for the slight undulations of the body, although it is usually unmistakably shown in pottery designs. This bird-serpent combination in which the bird is shown pecking at or swallowing the snake is quite common in the early Hohokam period in elaborate bone, stone, and shell carvings.³³⁰ Bradfield illustrates two bracelets of this sort from the Mimbres.³³¹ It is well to note here that the tendency to depict life forms on Colonial pottery was to a certain degree perpetuated in the shell carvings of the Classic Period when animal figures in ceramic decorations were no longer in style. Figure 94, *f* and *g* are further fragments of birds. The first illustrates the typical method of depicting the eye—a dot within a circle; the head also has a bifurcated crest which was previously noted in connection with a stone carved bird (fig. 85, *d*). Figure 94, *h* is a problematical carving.

Most curious of the animal pendants is example *i* (fig. 94). This creature has a long turned up snout set full of teeth as indicated by a row of shallow drilled pits. Figure 94, *j* and *k* are typical Hohokam forms. Examples

³²⁷ Nesbitt, 1931, pl. 41, *b*; Bradfield, 1931, pl. CIII, no. 531; Cosgrove, 1932, pl. 76, *c, c'*; Hough, 1914, pl. 26, no. 15 (wood from Upper Gila).

³²⁸ Woodward, 1930; Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 143-144.

³²⁹ Bradfield, 1931, pl. CII, nos. 559, 560.

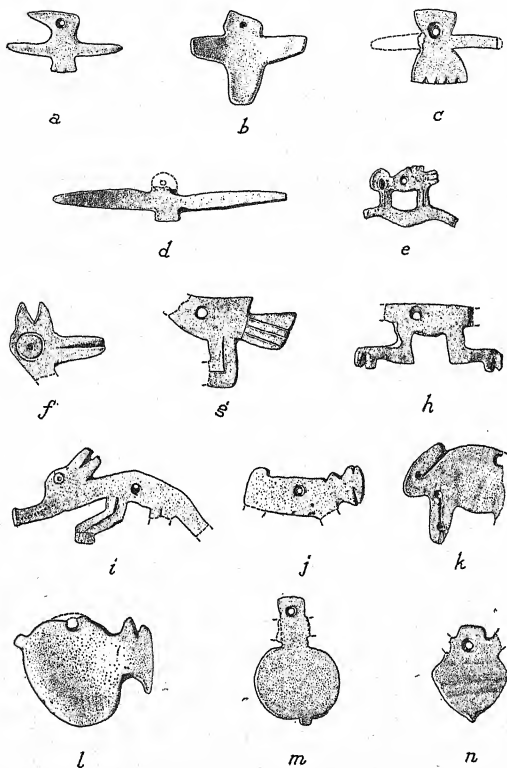


FIG. 94. Los Muertos. Shell carvings. Length of *i*, 1½ inches.

l, *m*, and *n* illustrate a less common round-bodied type. Animal carvings reminiscent of those just illustrated from Los Muertos are reported from Chevlon ruin,³³² Kiatuthlanna, eastern Arizona,³³³ the Upper Gila,³³⁴ the San Pedro,³³⁵ and the Mimbres.³³⁶

A few general observations may be made

concerning the cut shell pendants. In addition to showing anatomical features by direct engraving on the pendants, it is certain also that paint was used. Remnants of blue and green pigments are visible on pendants *j* and *k*, figure 93, and *l* of figure 94. The paint seems to have been an all-over covering.

³³² Fewkes, 1904, p. 92.

³³³ Roberts, 1931, pl. 42, *f*.

³³⁴ Hough, 1914, fig. 43, *g* and *i*.

³³⁵ Fewkes, 1909, fig. 75, *e*.

³³⁶ Nesbitt, 1931, pl. 41, *j* and *k*; Cosgrove, 1932, pl. 74, *z*.

Life-form pendants of shell had early beginnings. This will be brought out more strongly upon the examination of some of the other ruins investigated by the Hemenway Expedition as well as the reliable evidence of Snake-town. An occasional specimen dates from as early as the Sweetwater Phase but there was a notable increase during the Santa Cruz and Sacaton Phases.³⁸⁷ While the feeling and the subjects carved remain fairly constant throughout, the Classic Period witnessed an intensification in cut shell pendants with special emphasis on the frog and geometric pieces.

BRACELETS: The universal shell used for bracelets and armlets was the *Glycymeris*. It not only had the requisite circular shape for this type of an ornament but the walls of the valves were substantial enough to permit the necessary reduction. The average diameter of Los Muertos bracelets is about $2\frac{1}{2}$ inches. There are but few examples which could have been used as armlets. The number of whole specimens in the collection is only sixteen, but this does not truly register their abundance as the broken bracelets rise into the hundreds. Where they passed through the crematory fire breakage was almost inevitable. The practice of wearing great numbers of bracelets on the arm, as in the Mimbres³⁸⁸ and further north,³⁸⁹ seems to have been less common in the Gila. This would account for the dearth of bracelets in more than a hundred burials.

The method of reducing a shell into an armlet was simple enough. The convex side was worn down on a grinding stone, or, the superfluous shell was broken out after rasping and filing as clearly shown by Woodward.³⁴⁰ The residue of this process is illustrated by *q*, figure 97. Either of these methods naturally formed a band which had then but to be completed by further grinding into the desired thickness. Chipping, or breaking down the thin edges produced by the grinding, was also used so as to hasten the process. The finished products are usually very thin, being on an average about $\frac{1}{4}$ inch through. Attention may be called to several variations in bracelets, espe-

cially as this concerns the umbo or beak portion of the shell. The simplest and the most common form has the slightly projecting beak unaltered as *a* in figure 95. In about seventy-five per cent of cases the beak was perforated naturally during the process of the grinding and in very rare cases was it actually drilled (fig. 95, *b*). The naturally pierced holes do not show any wear, and it is therefore doubtful whether anything was ever attached to them, as, for example, a small pendant. The wearing down of the beak into a point (fig. 95, *c-e*), either perforated or plain, and the cutting away of the sides so as to produce a squarish projection which is usually not pierced (fig. 95, *f, g*) are further but less common modifications. The foregoing applies especially to the thin style of bracelet as illustrated in plate 71, *f, g*.

Bracelets with a broader band, sometimes reaching a width of an inch, indicate the most interest in the umbonal region of the shell. Here, as before, the simplest type remains undifferentiated (fig. 95, *b*); then a triangular region, conforming to the natural elevation of the shell is embossed by cutting away the shell at the sides (fig. 95, *i*). This is further set apart from the band by projecting it beyond the inner margin so that it is no longer the same width as the body of the bracelet (fig. 95, *j, k*). It now provided a suitable surface for further embellishment. The drilled pit in example *k* was probably the seat for an inlay. A favorite method was to carve this part of the bracelet into frogs, as illustrated by the fragmentary specimens in figure 95, *l, m*. This heavy-banded bracelet type was characteristically late in the Gila-Salt area, being primarily a Sedentary-Classic Period diagnostic.³⁴¹

The engraving of bracelets apart from the centerpiece was more prevalent in the Gila than in adjoining areas. This was pretty well confined to the broad band type but not universally. The simplest form was to nick the edges as in frontispiece, *a*. The inner margin of the *Glycymeris* valves most distant from the hinge is naturally crenate, but in the fabrication of the bracelet this was often obliterated.

³⁸⁷ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXVI, pp. 141-142.

³⁸⁸ Cosgrove, 1932, pl. 73.

³⁸⁹ Roberts, 1931, p. 162.

³⁴⁰ Woodward, 1936.

³⁴¹ Gladwin, Haury, Sayles, and Gladwin, 1937, p.

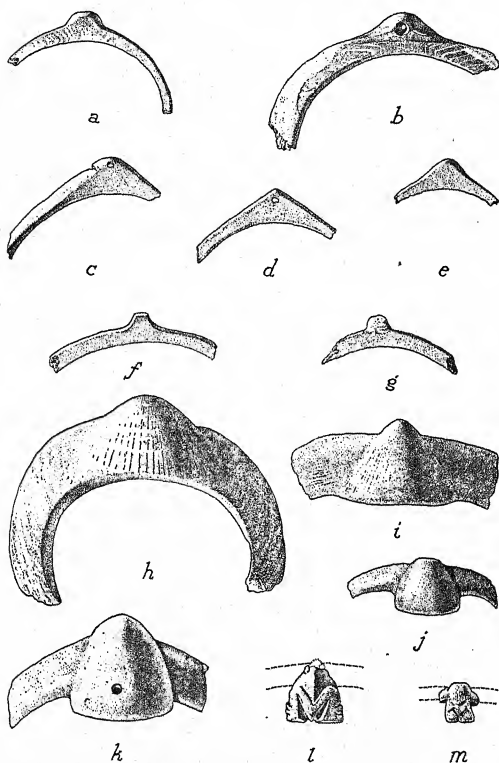


FIG. 95. Los Muertos. Variations in the treatment of the umbo of shell bracelets. Length of *b*, 3 inches.

Sometimes the artificial indentations were made to imitate this natural state of the shell, and under these circumstances they are frequently extended completely around the bracelet. Zig-zag and waved effects were produced by cutting opposed notches, or by more carefully eliminating a part of the band, as in *a* and *b* of figure 96. Incising in triangle patterns is shown

by *c* and *d* (fig. 96), while *e* and *f* are recognizable as a conventionalized form of intertwined serpents, seen to better advantage on whole objects found in the Grewie site.²⁴² To judge from current specimens the engraved lines were ordinarily filled with pigments (see frontispiece).²⁴³ As in the case of frog bracelets, carved arm bands are sporadic indeed in

²⁴² Woodward, 1930.

²⁴³ Also Fewkes, 1912, p. 143.

regions adjacent to the Gila-Salt area, the strongest trend being again to the east in the Mimbres.³⁴⁴ Bracelet carving can be traced with certainty back into the Colonial Period.³⁴⁵

RINGS: The prevailing type is made from a small *Glycymeris* shell in the same manner as

which exhibits the characteristic bevelling of the edge. These range from $\frac{1}{2}$ to about 1 inch in diameter. Specimens *e* and *f* are of *Haliotis* and nacreous freshwater shell, respectively, while the lance-shaped piece (*g*) is again of *Cardium*. The size range of squared

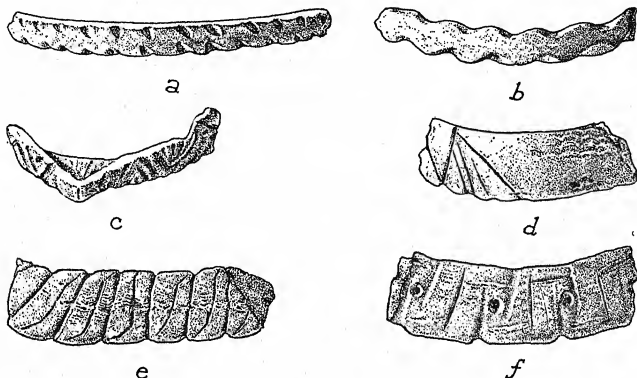


FIG. 96. Los Muertos. Fragments of carved bracelets. Length of *a*, $2\frac{1}{2}$ inches.

the bracelets (pl. 72, *a-d*). Diameters range from about $\frac{1}{2}$ to 1 inch. The collection has five whole examples and about thirty-five fragments. Next in abundance are rings made of the *Comus*, there being eight complete and seven fragmentary examples. The spire is first eliminated and then a section is removed from the large end varying in width from $\frac{1}{4}$ to $\frac{1}{2}$ inch. This is done by cutting (pl. 72, *e*). The resultant ring (pl. 72, *f, g*) is broad as compared to the first type and was sometimes carved (frontispiece, *c-e*). There are no unbroken rings representing the third type and only four fragments. These were cut out of a flat section of *Cardium* (pl. 72, *b, i*).

GEOMETRIC FORMS: Figure 97 illustrates a series of worked shell pieces of variable form. The most numerous of these are discs of *Cardium*, some of which were probably used in overlay. This is especially true of example *b*

pieces is shown by figure 97, *b* to *j*, while *k* is the only one with a central perforation and the edge bevelling. Example *l* is parallel sided with rounded ends; *m, n*, and *o* are triangular and *p* is a shovel-shaped piece of a beautiful orange color. Its use in mosaic seems certain. Examples *r* and *s* are the umbonal portions of large *Cardium* shells cut down so as to imitate small *Glycymeris* valves.

PAINTING AND INLAY: The painting of shell was undoubtedly practised more than the available information would suggest. This is especially the case with engraved objects. Since the pigment lacked permanent sticking qualities, it is only under the most favorable circumstances that evidences of it are preserved. Attention has already been called to painting on flat surfaces of some of the animal pendants. Other examples are: (a) a small *Glycymeris* with a narrow red band painted about the

(Elden Pueblo); there is also a fragment from Casas Grandes (Peabody Museum Collection).

³⁴⁵ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 143.

³⁴⁴ Nesbitt, 1931, p. 95; Bradfield, 1931, pl. CII, nos. 559 and 560; Cosgrove, 1932, p. 66; see also Fewkes, 1904, p. 89 (Chevron ruin); Fewkes, 1927, fig. 216

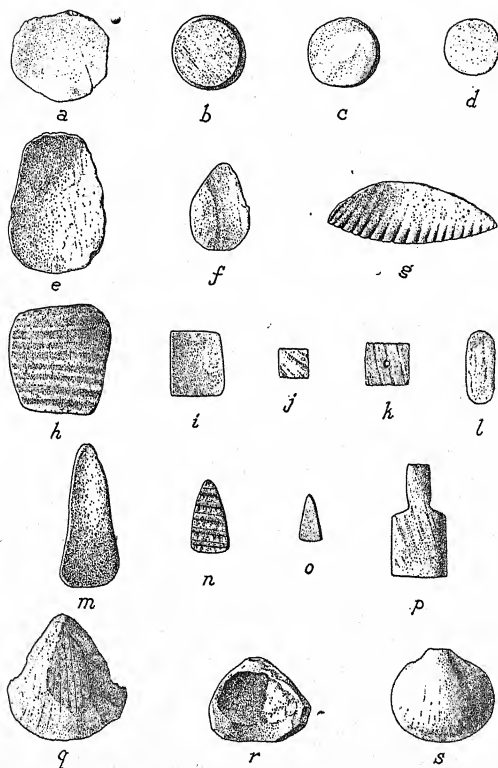


FIG. 97. Los Muertos. Worked shell objects. Length of g, 1 1/4 inches.

perimeter (fig. 98, a); (b) a fragment of *Cardium* on which there is the remnant of a more complicated pattern (fig. 98, b). The color is indeterminable. Pigments used in incised designs are chiefly red and black, as seen in the frontispiece.

In the entire collection of many hundreds of whole and broken worked objects, there are but five on which inlay was practised. The simplest of these was the single pit in the mid-

dle of the crest on the bracelet fragment of figure 95, k, from which the inlay is lost. The second is a bracelet with three small chips of turquoise seated into drilled holes (frontispiece, a). The turquoise fragments were not carefully rounded and they were cemented with a black substance, probably pitch.

The greatest elaboration in shell work is found in a combination of engraving, inlay, and painting. The three very ornamental ob-

jects — a bracelet, a ring, and a tinkler pendant — are of this type. The width of the field on the bracelet (frontispiece, *b*; fig. 98, *c*) into which the decoration was carved is $\frac{3}{16}$ of an inch wide. The pattern consists of small incised rectangles connected with diagonals. In the centers of the rectangles small troughs were

bars are sunk into the shell and painted red. The design is broken necessarily by the opening which was formerly the mouth of the shell.³⁴⁶ On the *Comus* tinkler pendant (frontispiece, *d*; fig. 98, *e*) turquoise and pieces of red shell were inlaid into the white background. The red shell may possibly have been derived from *Codakia distinguenda* (pl. 68, *f*), or from

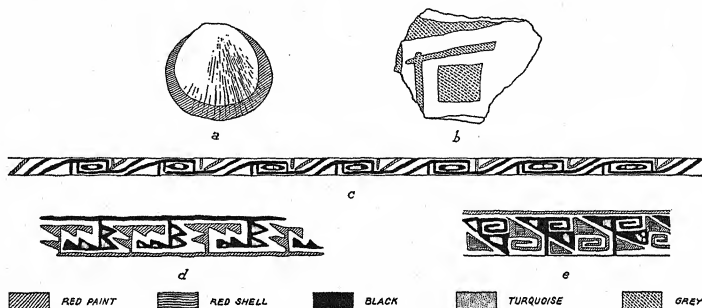


Fig. 98. Los Muertos. Painted shell (*a*, *b*); carved, inlaid, and painted bracelet and ring patterns (*c-e*). One-half original size.

gouged out for the inlaying of small bits of turquoise. These vary in number in each space from one to three. The incised lines were filled with black pigment excepting two short lines forming an angle to the right of each turquoise-filled area which are stained red. Only the umbonal part of the bracelet is without this decoration. The *Comus* ring has a diameter of $\frac{3}{8}$ inch and the decorative band is $\frac{1}{16}$ inch wide (frontispiece, *c*; fig. 98, *d*). One edge of the pattern is framed by a groove filled with black paint, the opposite framing line is marked off with red paint. These serve as the base for the attachment of the interlocking key patterns. Each L-shaped bar or key supports triangles which fall opposite each other in inverse relation so that the intervening space is a zig-zag line. The triangles of the keys suspended from the upper line are formed by small shaped pieces of turquoise under $\frac{1}{8}$ of an inch in length; the triangles of the opposed

the ribs of certain *Pecten* shells sometimes stained a beautiful red. The inlaid band is $\frac{5}{16}$ of an inch wide and the pattern is more complicated than in any of the preceding examples. Key patterns are used to separate the paired shell and turquoise triangles. The keys of the upper tier are painted black, the lower ones red. In addition, the mucilaginous substance with which the inlay is held in place adds a black border to the red and blue materials. The individual pieces of inlay here again were small and each was carefully trimmed to fit a triangular space.

The inlaying of shell was obviously a late trait, i.e., Classic Period. I am inclined to regard the Los Guanacos example (frontispiece, *e*, p. 178) as dating from a Classic Period occupation overlying this earlier site. The exceptionally full collection of shell artifacts from Snaketown, dating no later than the Sedentary Period, contains no examples of inlay.³⁴⁷

³⁴⁶ For a carved ring without inlay see Fewkes, 1912, p. 143.

³⁴⁷ For comparative Southwestern inlaid objects see:

Pepper, 1905, p. 187, ff; Fewkes, 1904, p. 90; Morris, 1919, pp. 101-102. All of these examples are Pueblo III or later.

Ceremonial Objects: TRUMPETS: As the only certain ceremonial objects from Los Muertos, there may be listed several univalve shells, unquestionably used as trumpets. The largest of these, a $6\frac{1}{2}$ -inch shell, is *Strombus galeatus* (pl. 73, a). The species is native to both the Gulf of Mexico and the Pacific. The shell was converted into a trumpet by removing the last whorl of the spire, making a hole above $\frac{1}{2}$ inch in diameter. Plate 73, b is a fragment of a second trumpet of the same species. The third (pl. 73, c) is a 3-inch univalve, *Melongena patula*, and also has the spire removed. Because of its smallness, it is difficult to blow and emits a high-pitched sound. Larger individuals of this same species were also used as trumpets in Las Acequias. Fewkes found both *Strombus galeatus* and *Melongena patula* trumpets in Little Colorado Ruins,³⁴⁸ and Pepper³⁴⁹ records one from Pueblo Bonito. It is possibly more than a coincidence that the species from the Gila³⁵⁰ and the Little Colorado are identical. Fewkes suggests that these were used to imitate the roar of the Great Plumed Serpent,³⁵¹ as in modern Hopi rituals. The trumpets employed, however, at this time are made of gourds instead of shell.³⁵² Cushing also notes the traditional use of conch trumpets among the Zuñi.³⁵³ The absence of shell trumpets in ruins other than those of the Sedentary-Classic and Pueblo III Periods pretty well fixes the element as to time. Excepting the example from Pueblo Bonito, they are restricted to the

region south of and including the Little Colorado.³⁵⁴

DISCUSSION

The above survey of Los Muertos shell objects, fitted into the picture of shell work at Snaketown, gives us a reasonably complete story of this industry among the Hohokam. Although a few species were known to them from the earliest, or Pioneer Period, it was not until the late Colonial Period that much elaboration took place. This appears to have culminated in the Sedentary Period (Sacaton Phase).³⁵⁵ Thereafter, and particularly during the occupation of Los Muertos, the present evidence indicates that there were more shells and more shell artifacts proportionate to earlier times, although there was some reduction in the number of species and in the number of the kinds of things made.³⁵⁶

A notable technique not represented at Los Muertos or in other Classic Period sites so far dug, was etching,³⁵⁷ apparently a Sedentary Period criterion. On the other hand, inlaying as described here, has not been certainly reported from pre-Classic sites.

The effect the Salado had on the shell artists of the Hohokam was probably very small. As a matter of fact, the influence appears to have worked in the opposite direction, reaching the Salado before they penetrated the Hohokam territory, as witness the Hohokam character of shell work in pure Salado sites.

OBJECTS OF BONE

The collection of unaltered and worked bone from Los Muertos is very meager. The dearth of the former — the bones of food animals — may be explained by two reasons: first, that all animal bones encountered in the diggings were not saved, and second, that fewer animal bones

are to be expected from the refuse of a people so completely dependent upon agriculture,³⁵⁸ although this type of life, of course, does not preclude the use of animal foods. The mammals identified from the few bones at hand are as follows:

1936, p. 29, indicates the range to be from Canada to Argentina.

³⁴⁸ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 152; Schroeder, 1940, p. 104.

³⁴⁹ Schroeder, 1940, p. 105.

³⁵⁰ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 148-151.

³⁵¹ This trend is recognizable in both the Gila and Salt drainages. Gladwin, Haury, Sayles, and Gladwin, 1937, p. 158; Schroeder, 1940, pp. 134-135.

³⁴⁸ Fewkes, 1896, pp. 365-366.

³⁴⁹ Pepper, 1920, p. 117.

³⁵⁰ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 147.

³⁵¹ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 365.

³⁵² Fewkes and Stephen, 1893.

³⁵³ Cushing, 1883, p. 390.

³⁵⁴ Insofar as the Southwest is concerned, Boekelman,

- Mule-deer (*Odocoileus hemionus macrotis*)
- Rocky Mountain Sheep (*Ovis canadensis gaillardi*)
- Cottontail (*Sylvilagus auduboni arizonae*?)
- Jack Rabbit (*Lepus californicus* sub-species?)

In Casa Grande, bones of the antelope, bear, and turkey were also found.³⁵⁰ To this list the dog should be added, as its bones were found in Los Hornos (see p. 183 and Snaketown³⁵⁰). Although Los Hornos is earlier than Los Muertos, there is every reason to believe that the dog existed also in the later villages. The negative evidence in the case of the turkey is probably to be interpreted differently. Fewkes noted the presence of turkey in Casa Grande, but it is doubtful whether it was ever kept here in large numbers.³⁵¹ The environment as such, lying far below the natural habitat of the bird, was probably unfavorable for turkey culture, and the Hohokam are believed never to have kept the bird at all.

The scarcity of bone artifacts in the ruins of the Gila Basin forecasts their singularly undifferentiated nature. An absence of large game animals, whose bones were preferable for tools, does not explain the lack, for these were available; nor will an explanation do that accounts for a soil condition which rapidly disintegrates bone. The answer may lie in the fact that the extremely hard woods offered by the semi-desert environment, as mesquite and ironwood, were substituted for bone. Some evidence for this is to be had from Casa Grande.³⁵²

The longest bone objects (fig. 99, *a, b*) are usually made of the metapodials of deer. Of a dozen examples there is not a single complete

specimen. Lengths would seem to average about 8 inches and the bones are so cut that the proximal ends preserve the tubular form, while the sharpened end tapers off to a long keen point. The function of these is problematical. Fewkes describes one found with a burial at Casa Grande as a dirk.³⁵³ The form and fashion of the implement are more suggestive of a weapon than of an awl or allied tool. Similar objects with ornately carved ends were found in the Grewe site³⁵⁴ and in the Mimbres.³⁵⁵ Plain forms occur in late ruins throughout the Tonto Basin and north as far as Flagstaff.

Awls consist chiefly of sharpened splinters of bone, usually deer, on which the heads or articular ends have been more or less removed (fig. 99, *c-f*). Specimens *g* and *h* are jack rabbit bone, the latter a sharpened radius. The points of the awls, *i* and *j*, differ from the others in having a very fine tip, apparently formed by reaming out holes. There are twenty-two awls in the collection and the lengths run from about 2 to 7 inches. Figure 99, *k-m* are fragments of long slender objects which were found with cremated human remains. The points are very sharp and a uniform rounded diameter of $\frac{1}{4}$ inch or less is maintained well below the tip. Complete specimens are lacking. Although there is no direct evidence as to the use of these in Los Muertos, Fewkes found in Elden Pueblo a long bone spike lying at the head of a skeleton as though it had been stuck in the hair, probably as an ornament.³⁵⁶ Figure 99, *n* is the distal end of a deer or sheep metapodial perforated with a $\frac{5}{16}$ -inch hole. The edge of a second perforation is also visible.

Los Muertos produced only two antler tools (fig. 99, *o, p*). Both were apparently used as flakers.

METAL WORKING

In his Berlin paper before the *Congres des Americanistes*, which outlined the results of the Hemenway Expedition's work in the Salt River Valley ruins, Cushing reports the finding "of traces of metal work, mostly cop-

per, with indications also of silver and gold work, by purely repoussé and blow-pipe treatment. . . ." ³⁵⁷ Beyond a copper bell which was found in Los Hornos (see pl. 85, *b-b'*), there are no tangible clues of metal working,

³⁵⁰ Fewkes, 1912, p. 146.

³⁵¹ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 156.

³⁵² Also rare at Snaketown, Gladwin, Haury, Sayles, and Gladwin, 1937, p. 157.

³⁵³ Fewkes, 1912, p. 147.

³⁵⁴ Fewkes, 1912, p. 145.

³⁵⁵ Woodward, 1930.

³⁵⁶ Cosgrove, 1932, pl. 59.

³⁵⁷ Fewkes, 1927, fig. 212.

³⁵⁸ Cushing, 1890, p. 183; see also Baxter, 1888, p. 38.

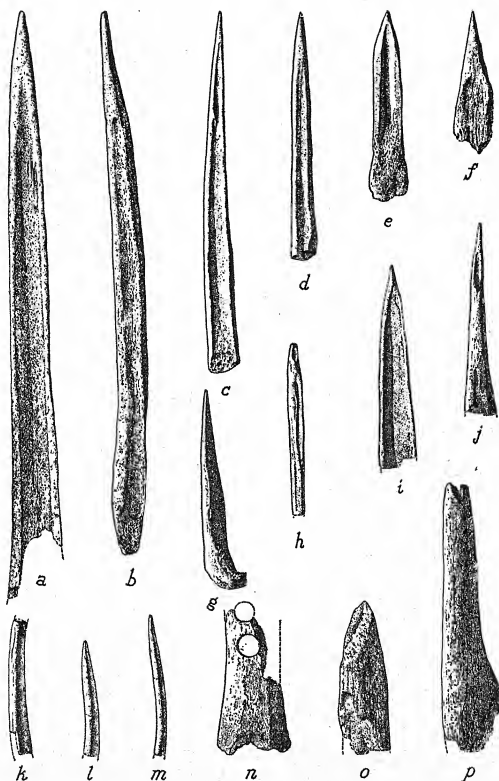


FIG. 99. Los Muertos. Bone and horn objects. Length of *a*, $8\frac{1}{4}$ inches.

either from Los Muertos or the other ruins. The "slag" from some of the large pit ovens, believed by Cushing to have been used as furnaces,³⁶⁸ was nothing more than vitrified clay sometimes associated with earth ovens. Metal objects do occur in Southwestern ruins but these are prevailingly copper bells, generally believed to be importations from the south or

locally made by a metallurgist from there. Silver and gold objects are notoriously absent, and it goes without saying that repoussé and blow-pipe techniques were not a part of the equipment of a people unacquainted with the working of metals. Hence, a few clay objects, as spindle whorls, reported in the catalogue to have been covered with metals, can be com-

³⁶⁸ Cushing, 1894, pp. 94-95.

pletely discounted. Further, it does not seem logical that Cushing should have found several

"furnaces" and only one article of copper during fifteen months of digging.

PERISHABLE MATERIALS

When the several thousand imperishable objects from Los Muertos, included in the preceding survey, are compared with the few specimens of perishable nature, preserved through charring or other favorable circumstances, the distortion of a picture drawn from only one class of archaeological material becomes very apparent. Certainly a people who were wholly sedentary, capable of constructing miles of irrigating ditches, producers of good pottery, and skilled in the polishing of stone, were also conversant with other crafts, as textiles and in materials which have not survived. Our chances for ever reconstructing this angle of the whole Gila-Salt occupation are very slight for here nature provided almost no rock shelters suitable for habitation in which the rubbish deposits would be kept dry and preserved. The few small caves that do contain culture deposits yield mainly the ritual paraphernalia placed about shrines. Hence regarding such items as clothing and textiles, basketry, matting, wooden tools, and a host of other objects, the excavations in Los Muertos yielded next to nothing.

Food:⁸⁰⁰ All remains of vegetal foods are in a charred state, having been found in burnt rooms. Here, as everywhere among North American agricultural folk, the triad of corn, beans, and squash were the chief products. Corn was found either shelled or on the cob. On the few cobs which allow the counting of the rows of kernels, these number 6, 12, and 14. Several varieties of corn were undoubtedly grown during the Classic-Pueblo IV Period in the Gila Basin, as even at an earlier date differentiated corn was commonly grown farther north.⁸⁷⁰ Beans, probably *Phaseolus vulgaris*, were also supplemented by the native mesquite beans (*Prosopis glandulosa*), available on every hand and long an important item in the diet of the natives. The squash is represented by a stem fragment, probably *Cucurbita Pepo* L., the common pumpkin. One deposit of charred

foods contained all of these varieties, as well as pieces of cane cigarettes and small fragments of undefinable wooden objects.

Wood: Two conditions are responsible for the preservation of a handful of wooden artifacts in the unprotected houses of Los Muertos. The first is the durability of the wood used, and the second is the fact that, due to a quick run-off of rain water from the mound, soil moisture seldom penetrates to more than a foot below the surface. All of the articles are of ironwood. The best preserved are illustrated in plate 74. Examples *a* and *b* are handles, probably of stone knives. They are 4 and 5 1/4 inches in length respectively and about 3/4 of an inch in diameter. The remainder of the tools, seventeen in number, are paddle shaped. The less deteriorated, as *e* to *i*, show a bevelled or oblique end with sharpened edge. The blades average about 3 inches in width and the length extremes are 3 to 12 1/4 inches. The handle portion is from 2 to 3 inches long and about 1 inch in width. The average thickness is 1/2 inch. Specimen *i* owes its excellent condition to the protection of a cooking pot in which it was found. This would tend to show that it was a stirring paddle, but if used in a rotary motion as this implies the obliqueness of the sharpened edge would not have been maintained. The characteristic bevel of the broad end may possibly be traced back to an interesting source. In Casa Grande, there were found a number of "wood shovels"⁸⁷¹ from 4 to 5 feet long which display the same oblique edge and the differentiated handle. The blade proper is flat and maintains a uniform width throughout its length. The similarity of these tools to weaving swords is obvious and there is thus some justification for regarding them as weaving sword hoes. The shorter examples as illustrated are then but abbreviated weaving sword hoes in which the pattern has been preserved. There is also a perceivable functional reason for the existence of the bevel in the small tools.

⁸⁰⁰ For animal foods see p. 160.

⁸⁷⁰ Kidder and Guernsey, 1919, pp. 154-155.

⁸⁷¹ Fewkes, 1912, p. 146, 1907, pl. XXXIX, g.

If used as hand cultivators, the slanting edge would increase the efficiency and make them somewhat easier to handle in the soil. Weaving sword hoes occur as a cultural factor in northern Mexico,³⁷² although it has not been ascertained whether or not they antedate the Classic Period of the Hohokam; the Papago of Santa Rosa use them, reputed to be an ancient tool among them,³⁷³ and Russell³⁷⁴ reports that the bevelled hoe-spade of ironwood is old among the Pima.

Wooden tools of the type described for Los Muertos are commonly called pottery paddles, a logical assumption, as most of the pottery was paddle-and-anvil made. But modern paddles do not display the distinctive beveled end.³⁷⁵ One surface is usually slightly concave, so as to conform to the shape of the vessels made, and the blades are thicker. These features are lacking in the archaeological paddles. It is conceivable that the latter were used by potters, although their chief purpose may have been for digging and hand cultivation.

Matting: Only the impressions of matwork in clay remain as evidence of this form of weaving. The under sides of the *comales*, or baking slabs, it will be recalled, almost universally bore the imprints of the coarse mats on which they were made. The weave in all cases was the same: a twilling in an under-2 and over-2 movement. The weaving elements are composite, i.e., consisting of narrow cane or grass stems laid parallel in bands of $\frac{3}{4}$ to 1 inch in

width (pl. 75). Matting of this identical sort was until recently made by the Pima of a hollow-stemmed cane (*Phragmites communis*) from the river bottom. This no longer grows, as most of the river's water has been diverted into irrigating canals.³⁷⁶

Basketry: (See under Las Acequias, p. 170.)

Textiles: It is reasonably certain that the chief fiber for textiles was cotton, although Fewkes notes a second undetermined fiber in some of the fabrics found at Casa Grande.³⁷⁷ Raw cotton is reported to have been found in Ruin I and a matted quantity of it was found in excavating a section of an irrigating ditch. It is astonishing that cotton could be preserved under such conditions, but apparently a fine silt with which it must have been covered soon after immersion in water is responsible. Hundreds of small freshwater snail shells (*Physa* sp.) were ensnared in the fibrous mass. Probably after a cotton harvest, loose fibers were blown into the canal where they would soon collect and ultimately sink to the bottom, there to become matted and thoroughly impregnated with silt.

The sole fragment of woven fabrics from Los Muertos was paradoxically found with cremated remains. By chance, the textile, charred by the fire and protected thereafter, adhered to a bone and so survived. The weave is plain; warp and weft yarns are of equal size and average about $\frac{1}{32}$ to the inch in each case.³⁷⁸

LAS ACEQUIAS

Las Acequias was situated about five miles north and slightly east of Los Muertos and about two miles from Salt River (fig. 1). The village took its name from the fact that, like Los Muertos, it was flanked on the east and west by *acequias* or canals which not only supplied the inhabitants with water but made the tilling of the neighboring fields possible. The house units of this settlement were apparently concentrated along the banks of the main ar-

tery that took water from the river some four miles farther up stream than the canal leading towards Los Muertos (see fig. 24; Turney's Canal 9). After serving Las Acequias, this ditch extended southward for about seven miles, becoming the easternmost artery of the Los Muertos group. No traces of the house mounds which once comprised Las Acequias are to be seen today amid the present cultivated fields.

³⁷² Beals, 1932, p. 142.

³⁷³ Lumholtz, 1912, p. 69.

³⁷⁴ Russell, 1908, p. 97.

³⁷⁵ Russell, 1908, p. 101; see also Campbell, 1931, pl. 43, b, for early historic (?) paddles from the Twenty-Nine Palms region, California.

³⁷⁶ Kissell, 1916, pp. 153-154; see also fig. 12.

³⁷⁷ Fewkes, 1912, p. 148, probably apocynum.

³⁷⁸ For further textiles from this area see p. 201 herein; Fewkes, 1912, pp. 147-148; Hough, 1914, p. 79.

The extent of the Hemenway Expedition's labors in Las Acequias is not made clear in the existing record and there are no maps to serve as guides. In the field catalogue specimens are listed as having come from house units numbered from I to XV. On the basis of this fact, one would judge Las Acequias to have been somewhat less than half the size of Los Muertos, although it is not certain that excavations were made in all house mounds. Turney³⁷⁹ places the largest mound, or so-called temple, on the west bank of the canal, whereas on the Hemenway map (fig. 1) this appears on the opposite side of the ditch. While we do not know the exact architectural nature of the village units, there is every reason to believe that the house units correspond, at least in plan and probably in detail, with the Los Muertos houses. The character of the material culture of Los Muertos and Las Acequias, comparable as to kind and differing only as to quantity and proportions, is unequivocal evidence as to the historical status of the latter site. Like Los Muertos, it was a Classic Period village.

The dead were found either inhumed or cremated but in surprisingly different proportions than at Los Muertos. At the latter, it will be remembered, cremations (Hohokam) outweighed earth burials (Pueblo) by about three to one; in Las Acequias 172 burials are listed as opposed to less than ten cremations. On first sight this would seem to be a significant pointer that one of two conditions existed: (a) a change in burial custom, or (b) an

overwhelming preponderance of the Pueblo element in the village's roster. Yet neither of these alternatives is likely, as a difference in time between Las Acequias and Los Muertos would be desirable to postulate such a change, and this cannot be shown, because strictly Hohokam cultural material is proportionately as abundant as in Los Muertos. The obvious explanation of this situation is to be charged to an all too common emphasis by excavators on the recovery of burials, which usually yield the richest returns. Long experience in Los Muertos had brought out the difference between cremation and inhumation in this respect, and had also taught where earth burials were to be expected. Consequently, it may be assumed that the above difference is purely an artificial one, and that the actual condition probably parallels that of Los Muertos, brought out there by the more thorough and extensive explorations.

The field record lists about 525 specimens from Las Acequias. As the complexion of this material is like that of Los Muertos there is no need for a duplication of description. Only where significant differences occur, where gaps in the Los Muertos material may be filled, or where certain points can be amplified, will further specimens be included. It should be reiterated in passing that Las Acequias experienced the dual occupation seen in Los Muertos and that the collection, therefore, contains the cultural elements of the Hohokam and Pueblo groups.

POTTERY

RED-ON-BUFF

A small proportion of the red-on-buff ware in sherd form is clearly a survival from an earlier time. It is evidence of the demonstrable fact that practically every major late Gila-Salt site is on the remains of older Sedentary and Colonial villages. The flared bowls with decoration in repeated elements constitute the bulk of the early wares. One complete (fig. 100) and one fragmentary example of the thick-walled vessels were also found. These are probably of Sacaton Phase age.

³⁷⁹ Turney, 1924, pp. 6-7.

In the Casa Grande Red-on-buff of Las Acequias the vertical-necked jar is the most prominent of the shapes. Plate 76, *a*, a cremation urn, is of this type, although the vertical neck is partly hidden by the inverted jar cover. The decoration is very characteristic of the period. The inverted jar, however, seems to have the features most commonly found to the south, in both decoration and form, although in paste it is probably a local product. Jar *b* (pl. 76) is a very fine example of the acute flattening of the lower part, a feature which persisted over a long period of time but which was abandoned

at some time during the end of the Classic Period.

Pitchers are identical with those of Los Muertos. The best example from Las Acequias is shown in plate 76, *c*. The lack of Classic bowls or bowl sherds substantiates the feeling

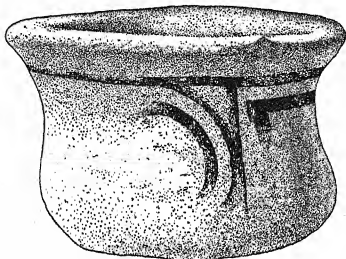


FIG. 100. Las Acequias. Thick-walled vessel, probably Sacaton Phase. Diameter, $3\frac{1}{2}$ inches.

expressed previously that vessels of this shape were neither abundant nor characteristic at this late time. The collection has one nearly complete red-on-buff scoop. It is of the shallow, relatively broad, horizontal-rimmed variety of scoops.

The few intrusive red-on-buff sherds are to be referred to the Tucson area and are of the Tanque Verde Red-on-brown type.

POLYCHROME

Of the twenty-two polychrome vessels, fourteen are bowls, the remaining eight being divided among jar, mug, "basket," and bird effigy forms (the latter was broken and made over into a scoop, pl. 77, *b*). Attention may be called to a few. Plate 77, *e* is a hemispherical bowl with exterior decoration more commonly found on the recurved type; *g* has a flared and thickened lip which was not represented at Los Muertos; *f* is a small recurved bowl with a decoration superior in quality to that usually found; the incurved bowl *a* is painted on the exterior only; and *b* is the normal type of small jar. The mug (*c*), while differing only slightly from the Los Muertos example (pl. 11, *d*) in shape, has the design painted in black and red

over the white slipped band. The bottom is red. The bottom of the bird vase (*b*), utilized as a scoop, shows this same type of painting. The handled specimen (*d*) or "basket" type, is new in this study but there is a red-on-buff prototype from Snaketown.³⁹⁰ The diameter of the bowl is 5 inches. The handle is of the strap type in contrast with the rod type found on the mug and handled red ware vessels. Its width is $\frac{3}{4}$ of an inch and it bears a black decoration on a white ground.

RED AND SMUDGED WARE

As these types (Gila and Salt) from Las Acequias were burial rather than cremation furniture, and did not, therefore, pass through the pyral fire, they retain all the richness of the original color and the full effect of the firing clouds. A very conspicuous difference between Los Muertos and Las Acequias pottery is to be noted in this point. Dissimilarity ends here, however, as in shapes and other characteristics these types from both ruins are homogeneous. The 111 Las Acequias examples are distributed in the shape categories as follows:

Bowls	77
Jars	9
Pitchers	4
Scoops	10
Vases	5
Mugs	3
Bird effigies	3
	<hr/> 111

Handled cups, tripod, incurved, and painted vessels are lacking. In the main, the proportions are the same as for Los Muertos. Figure *a* (pl. 78) an inverted outcurved bowl of medium depth, has a perforation in the bottom. This was first broken through from outside to inside and then enlarged by reaming until the hole was $\frac{1}{8}$ of an inch in diameter. The care with which the hole was made probably means that it was not a case of ceremonial "killing." Example *b* is a well-finished miniature bowl or cup without handle, having a $2\frac{1}{4}$ -inch diameter. Vessels *c* to *i* show the characteristic jar, pitcher, scoop, mug, and other bird effigy forms.

³⁹⁰ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXXXIX, *g*.

PLAIN WARE

There is but one plain ware jar, globular as to form with a slight medial shoulder and large mouth. The diameter of this jar is about 8 inches.

CORRUGATED WARE

Las Acequias produced one nearly complete

jar showing a corrugated technique but the coils are almost obliterated by subsequent smoothing. The jar is about 12 inches in diameter, ellipsoidal in shape, and the corrugations are apparent over the whole body of the jar as contrasted with the neck corrugation of the type found at Los Muertos. This jar is obviously a local product, undoubtedly made by a Salado potter.

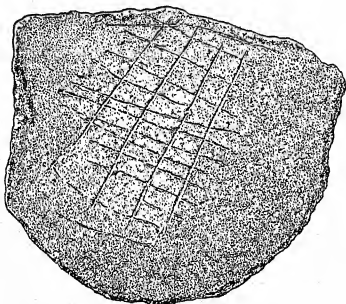
MISCELLANEOUS CLAY OBJECTS

FIG. 101. Las Acequias. Salt Red sherd with scratched pattern. Width, $\frac{3}{4}$ inches.

As for miscellaneous clay articles in Las Acequias, it is well to mention the absence of griddles, perforated plates, and figurines. This probably has no other significance than to emphasize a fact already mentioned, namely, that most of the work was done in burial areas and less on houses where objects of this type would be most likely to occur.

Of spindle whorls both the specialized and perforated sherd types are present. There are nine of the former: three spheroidal (two with medial groove), four ellipsoidal, one discoidal, and one pulley shaped.

Figure 101 is a Salt Red jar sherd bearing on the outer surface a shallow incised block pattern. This was done after the firing. While it probably is nothing more than someone's idle scratching, graphic representation of this type is not frequently seen.

OBJECTS OF STONE

The Las Acequias collection of stone implements is far less complete than that described for Los Muertos, and although most of the tools can be duplicated in the latter, a few additional points are noted in the paragraphs below.

CHIPPED STONE

Knives: Chipped knives (?) were very rare at Los Muertos and only one was found in Las Acequias (pl. 79, c). This is a triangular blade with convex edges, $2\frac{1}{4}$ inches long. The flat base preserves the striking platform of the original flake.

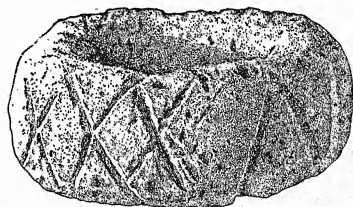


FIG. 102. Las Acequias. Lava paint mortar. Diameter, $\frac{3}{4}$ inches.

Blades: Las Acequias produced one of the large obsidian blades (pl. 79, e) previously alluded to from Los Muertos. This example is

reported to have been found in the grave of a "priest," Ruin II, which also contained the following articles: shell and turquoise pendants, fifty-two arrow points (not now in the collection), worked coyote bone (see fig. 109, *a*), bone "dirk" (see fig. 109, *b*), deer horn flaker, quartz crystals, and paint materials.

Club Head: The notched stone club head shown in plate 79, *d*, differs from that of Los Muertos in possessing rounded ends instead of the more common sharp ends. It is crudely chipped out of a compact crystalline rock.

Projectile Points: The collection is very meager,³⁸¹ but a type unrecorded for Los Muertos is present. This is a slender point with rudimentary, tangless stem (pl. 79, *a*, *b*). The sides of both are moderately concave and finely serrated. In the slender proportions, this type adheres to the pattern of projective points current in the Gila Basin during the Santa Cruz Phase.³⁸²

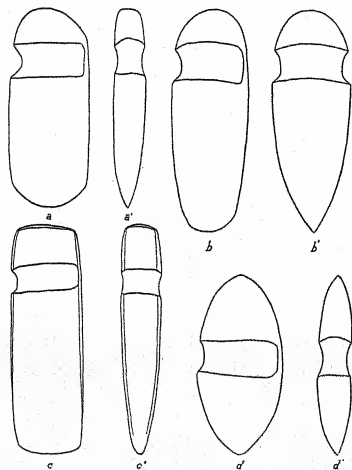


FIG. 103. Las Acequias. Axes (*a-c*) and double-bitted implement (*d*). Length of *c*, 9 3/4 inches.

³⁸¹ All points found during the excavation are no longer in the collection as the fifty-two points recovered from Burial 28, Ruin II, cannot be located.

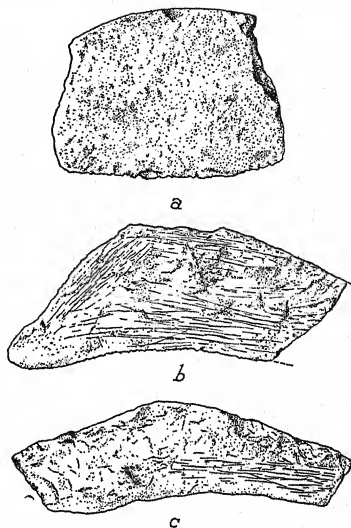


FIG. 104. Las Acequias. Notched hoe (*a*) and cutting blades (*b*, *c*). Length of *c*, 8 1/4 inches.

PECKED AND POLISHED STONE

For metates, mortars, and pestles there is no information; manos conform to the Los Muertos type. No fundamental differences in these implements are to be expected.

Paint Mortar: Figure 102 is a shallow mortar of vesicular lava with criss-cross ornamentation.

Axes: Of the fifty Las Acequias single-bitted axes, none evidence the ridge marginal to the groove or the wedge channel. The typical axe agrees in all details with those of Los Muertos. Figure 103, *a* is an unusually thin specimen, while *b* is abnormally full and thick. Figure 103, *c* approaches the square type which may possibly have southern affinities. Example *d* is a variation of the double-bitted type

³⁸² Gladwin, Haury, Sayles, and Gladwin, 1937, pl. XCI, *a*.

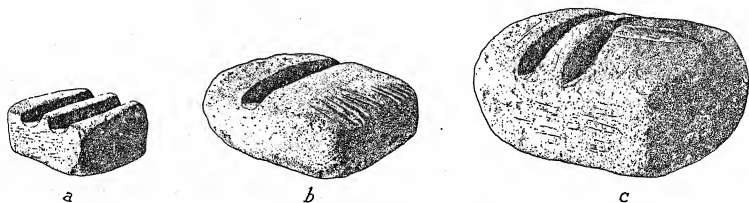


FIG. 105. Las Acequias. Arrow shaft straighteners. One-half original size.

in that it has more pointed ends. It agrees in shape with some of the crudely chipped club heads, but differs in that it has a $\frac{3}{4}$ groove and was made by a pecking-polishing method.

Adzes: There is one unfinished example $5\frac{1}{2}$ inches long and one which has been regrooved for an axe.

Hoes and Cutting Tools: Among fifteen so-called hoes or digging tools from Las Acequias, there is but one of the notched variety, the notches being very shallow (fig. 104, *a*). The blade is $6\frac{1}{2}$ inches across the longest dimension.

There are also two tools with concave working edges, used for cutting purposes. The material is schist and the length of both blades is slightly over 8 inches (fig. 104, *b*, *c*).

Arrow Shaft Straighteners: Of the five in the collection there is one crude example with four grooves; two are of carefully squared chunks of talc schist, each having two grooves (fig. 105, *a*); one has a single groove in the center with short incisions on the upper surface at one end (fig. 105, *b*); and the last has two grooves with a transverse ridge (fig. 105, *c*). This is the only ridged straightener of all those collected by the Hemenway party. In this character it bears a resemblance to some found at Pecos,⁸⁸³ although the Las Acequias straightener lacks the ridge paralleling the groove. Further, it is the only example which definitely shows the effects of heating, a process resorted to by the Indians of southern California when the cane arrow shafts were being trued.⁸⁸⁴

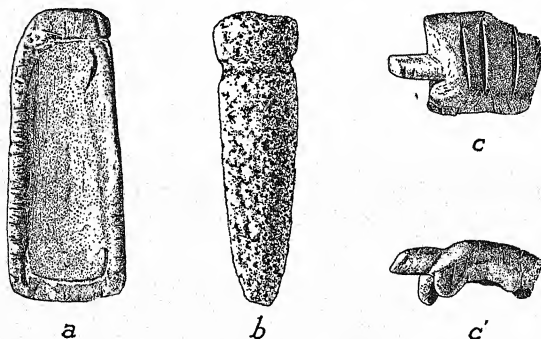


FIG. 106. Las Acequias. Miniature slate palette (*a*), lava "medicine" stone (*b*), and fragment of carved animal (*c*, *c'*). Original size.

⁸⁸³ Kidder, 1932, pp. 76-80.

⁸⁸⁴ Kroeber, 1925, p. 530.

Slate Palettes: Only two fragments and one small tablet (fig. 106, *a*) were found. The previous explanation for the lack of more complete tablets in the late ruins was that these had been discarded by Classic times. Las Acequias further confirms this idea.

"Medicine" Stone: There is but one example from Las Acequias, typical in all details (fig. 106, *b*).

Carved Stone: Figures *c* and *c'* (fig. 106) are top and side views of a fragment of a small animal effigy ($1\frac{1}{2}$ inches long) carved from a piece of soapstone. Concerning the larger effigy stones, the same puzzling absence must be noted for Las Acequias as for Los Muertos.

Perforated Stone: The fragmentary double-perforated stone shown in outline and section in figure 107 is made of a water-rolled piece of lava. Toward each end and on both sides conical-shaped pits were made by pecking. These were cut through, making perfora-

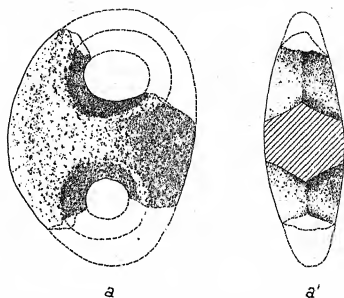


FIG. 107. Las Acequias. Double-perforated stone. Length, $9\frac{1}{2}$ inches.

tions of about $1\frac{1}{2}$ inches diameter. The use to which this stone was put is not known. In all but the double perforating, it resembles the "crushers" from Los Muertos.

OBJECTS OF SHELL

The number of species of marine shells at Las Acequias is not so large as at Los Muertos. This deficiency, as well as others, such as in carved shell pendants, is probably not significant, realizing the character of the excavations in Las Acequias. The *Unio* shell pendants, presumably from Texas, are not represented.

Figure 108, *a* is a *Cardium elatum* shell of medium size from which a "U"-shaped section has been cut; *b* and *c* are fragments of incised bracelets, *d* is a $1\frac{1}{4}$ -inch bead made from the casing of a marine worm (*Vermetus*); and *e* is a tear-drop-shaped pendant of pink shell, $\frac{1}{2}$ inch long.

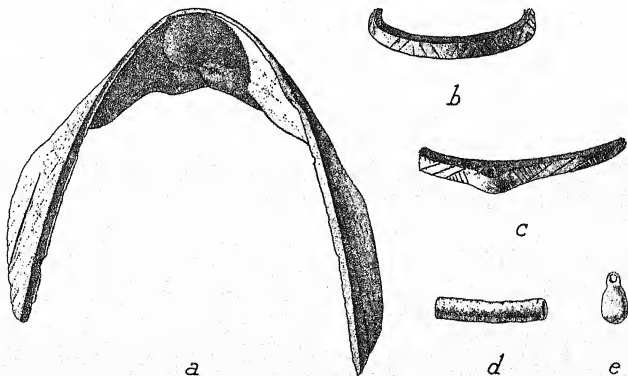


FIG. 108. Las Acequias. Shell objects. Diameter of *a*, $4\frac{1}{2}$ inches.

OBJECTS OF BONE

In addition to a few small, poorly preserved, splinter awls, there is a coyote tibia sawed longitudinally from end to end (fig. 109, *a*), a process usually resorted to in the making of long awls. Figure 109, *b* is a "dirk," drilled at

the handle end. This and the coyote tibia were found with burial 28 in Ruin II, presumably that of a priest. Figure 109, *c* is a pointed tool, somewhat shorter than the above "dirk," perforated at the large end.

PERISHABLE OBJECTS

OBJECTS OF WOOD

These consist solely of the paddle-shaped tools described for Los Muertos. Figure 110, *a* presents a slight variation in a narrower blade and less distinction between blade and handle.

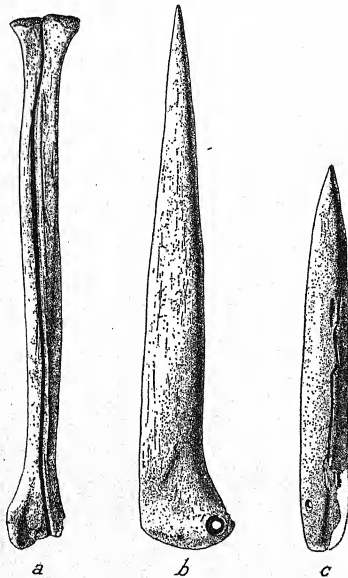


FIG. 109. Las Acequias. Bone objects. Length of *b*, 7 $\frac{1}{2}$ inches.

The maximum width is 1 $\frac{1}{2}$ inches. This may have served as a stirring stick for culinary purposes. Figure 110, *b* is also narrow bladed (1 $\frac{1}{2}$ inches), while *c* is of the normal type.

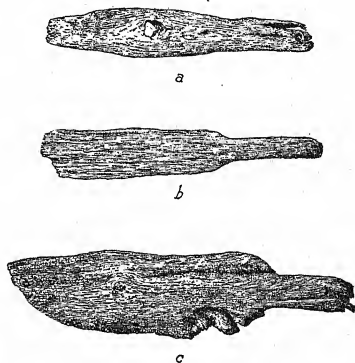


FIG. 110. Las Acequias. Wooden paddle-shaped implements. Length of *c*, 10 $\frac{1}{4}$ inches.

BASKETRY

The evidence of basketry in Las Acequias exists in the form of semi-decayed fragments of a single small bowl-shaped container found in the "western temple," and the impression of the greater part of a plaque in a mass of clay. In both cases, a coiled technique is used, and in the actual remnants the details of the weave can be determined. The foundation material consists of three slender rods, each about $\frac{1}{16}$ of an inch in diameter, two of which are laid side by side on the preceding coil, the third rod resting on top of these. A triangular cross section is thus formed. Each stitch, or turn of the sewing splint, is passed underneath⁸⁸⁸ the

⁸⁸⁸ Weltfish, 1932b, fig. 11, shows the sewing element as passing through the upper rod in other three-rod-triangular-foundation coiling from the Southwest.

single upper rod of the previous coil, as illustrated in figure 111. Four rods are therefore inclosed within each turn of the sewing material. Due to pulling the splints snugly into place, the rods were pressed quite flat. The stitches do not interlock³⁸⁶ and the spiral is counter-clockwise. Coils number from about five to the inch and the stitches approximately ten.

Three-rod-triangular-foundation coiling from archaeological deposits has been shown

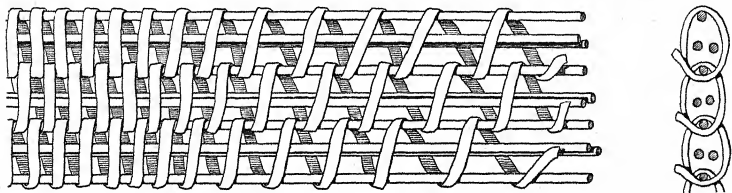


FIG. 111. Las Acequias. Three-rod foundation coiled basketry.

to be rather restricted, yet erratic, in its distribution.³⁸⁷ The area is roughly triangular with western Nevada, southwestern Colorado, and the Middle Gila as the points. The historical position seems to be clearly late with the possible exception of some of the Lovelock Cave material. Weltfish believes that this type of basketry is not referable to the Anasazi coiled basketry complex,³⁸⁸ and it is suggested that three-rod-triangular-foundation coiling is a more southerly factor. If this is the case, it would be interesting to know whether or not it might prove to be the traditional Hohokam form of coiling. We have some evidence of coiled basketry during the Colonial and Sedentary Periods³⁸⁹ but apparently none was of this foundation type. The finding of three-rod-triangular-foundation coiling in Casa Grande and Las Acequias, as opposed to grass-

to determine the motives of this, a painting of indistinguishable colors exists. This curious combination of painting on coated basketry is to my knowledge a fairly rare phenomenon. I have seen similarly treated basket fragments which came from a grave in La Ciudad (Los Pueblitos), situated just east of Phoenix. These had clear patterns in blue, green, red, and yellow. A further example was found by Mr. F. H. Hawley with a burial in a Pueblo III ruin east of Flagstaff, the fragments of which are now in the Arizona State Museum at Tucson, and there is also a complete, though very fragile, specimen from Gila Pueblo. It was a burial offering and protected by a bowl. The basket is about 7 inches in diameter, comparatively shallow, and coated on the outer surface. The colors of the exterior decoration are blue, green,³⁹⁰ and red.

³⁸⁶ See Mason, 1904, p. 244. Weltfish, 1932a, p. 109, finds that practically all aboriginal Southwestern basketry of the type in question has non-interlocking stitches.

³⁸⁷ Weltfish, 1932b, p. 39, notes the following occurrences: Lovelock Cave, Navaho Canyon, Cliff Palace, Pueblo Bonito, Palatki, Chaves Pass, Cheylon ruin, and Casa Grande; Hayden, 1930, pp. 59-60, notes the finding of charred basket fragments of essentially the

same technique in Mesa House, southern Nevada. See also Tschopik, 1939, p. 117, *et seq.*

³⁸⁸ Weltfish, 1932a, p. 109; 1932b, p. 44.

³⁸⁹ Haury, 1932, p. 110; Gladwin, Haury, Sayles, and Gladwin, 1937, p. 159.

³⁹⁰ There is some indication that the original color was either only blue or green and that a partial chemical change of the copper pigments has taken place during its burial to produce the two colors.

Except for the Flagstaff case, this type of basket seems to be restricted to the more southerly pueblos, and they date mostly from Pueblo IV ruins.

TEXTILES

Carbonized cloth fragments add a few more details concerning textiles over those noted for Los Muertos. Two grades of cloth of two types of fibers are represented: (a) very fine cotton cloth of very tightly twisted warp and loosely twisted weft, averaging about 60 and 32 per inch respectively, and (b) coarse fabric of apocynum(?) with 2-ply warp, each being double stranded and counting out to about

6 per inch, while the more compact weftage of 2-ply yarns runs about 14 picks per inch. The charred state of the latter fragments renders an identification of the fibers impossible. It is certain that they are neither cotton nor yucca; in character the bast fiber apocynum (Indian hemp) is suggested, which was found to have been very commonly in use for coarse textiles on the upper Salt at about the same time as the occupation of Las Acequias and Los Muertos.³⁰¹

The side selvage on the cotton remnant consists of a pair of multiple-stranded strings intertwined into the basic fabric. This method seems to be the standard for the whole of the Southwest.³⁰²

³⁰¹ Haury, 1934a, pp. 101-102.

³⁰² Kidder and Guernsey, 1919, p. 116; Hough, 1914, p. 77.

COLONIAL-SEDENTARY PERIOD SITES

LOS GUANACOS

ABOUT 2 miles north and slightly to the west of Los Muertos (fig. 1) excavations disclosed the presence of "numerous deeply buried huts. . . . So numerous indeed, were they, that they constituted a town in themselves."¹ Surface indications of these were not in evidence and it struck Cushing as particularly noteworthy that there was no "temple" mound. To what extent the work was carried on here is not said. As Los Guanacos was not discovered until shortly before the Expedition concluded its labors in the Salt River Valley, it is possible that they were unable to carry their explorations to completion. About 275 specimens were collected among which there is very little whole pottery. In the first of the huts excavated there was found a whole group of about fifteen animal effigies (see pl. 82) which Cushing believed to be representations of some species of South American llama. He therefore named the place Los Guanacos derived from the species *Lama huanacos*, used for centuries as a beast of burden in the Andes; but this name is a clear misnomer, as no proof exists whatever of the former presence of this animal, or any other variety of *Auchenia*, in North America during man's occupation.

It is to be regretted that we have no knowledge of the type of huts excavated in Los Guanacos. There is no reasonable doubt but that they resembled those of roughly com-

parable age in the Gila Valley as described for Snaketown.² The stage of culture represented is one in which the *rancheria* style of community still prevailed, i.e., each hut was an independent unit and these were scattered at intervals over an area of considerable extent. The adobe-walled rooms of contiguous arrangement had not yet arrived. Architecturally, therefore, Los Guanacos differed from Los Muertos in lacking adobe buildings. It will be recalled that Los Muertos also had extramural houses or huts. These were probably much like those of Los Guanacos, as they are believed to have represented the dwellings of the Hohokam alongside their immigrant Pueblo neighbors.

A large basin-shaped depression, likely a ball court, is said to have occurred in this vicinity.

Since none of the objects recovered from Los Guanacos are listed in the catalogue as having been found with either burials or cremations, a practice in recording rigidly followed in the other sites, it may be inferred that neither were found. This absence of human remains is not surprising in an area where the houses were deeply buried and trash mounds were lacking, for, only by a stroke of fortune could the cremation plots be located. As for the custom of inhumation, as has previously been pointed out, this was not introduced until a later period by the Pueblo folk.

POTTERY

RED-ON-BUFF

The full analysis of the red-on-buff from Los Guanacos as attempted for Los Muertos, or even of the combined red-on-buff from this site and from Los Hornos and Las Canopas, is not feasible because the material is inadequate.

There are present the following types, in sherd form (see types illustrated for Los Hornos, pl. 84):

Sacaton Red-on-buff
Santa Cruz Red-on-buff
Gila Butte Red-on-buff
Snaketown Red-on-buff

¹ Cushing, 1890, p. 177.

² Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 59, et seq.

POLYCHROME

Except for a modeled macaw head, broken from a Tonto Polychrome jar (fig. 112, *i*), no polychrome pottery was found in Los Guanacos. This is of importance because it further enables us to give priority to Los Guanacos over Los Muertos in point of time. The macaw head can, I believe, be entirely omitted from consideration as it has clearly been separated from its parent vessel and kept for its interest. As such, it would have been dropped on the site by the later peoples of nearby Los Muertos or Los Hornos.

RED WARE

There are only six whole vessels: four bowls and two jars. These are practically indistinguishable from the Gila Red ware of Los

Muertos, although in two cases the interiors have not been smudged and the finish in all appears to be somewhat less expertly done.³ Three of the bowls are hemispherical while the fourth has outcurving sides and a flattened bottom. One of the jars is an unusually large and fine example of Salt Red (pl. 80), having a capacity of about 17 gallons. This jar was found enclosed in an adobe cist where it probably served as a storage container. Several of these red ware specimens are certainly later than the main occupation in Los Guanacos, as for example, the large jar which by type is diagnostic of the Civano Phase.

PLAIN WARE

Plain ware is represented by sherds only, excepting several miniature vessels, and is indistinguishable from that from Los Muertos.

INTRUSIVE POTTERY

There is but one sherd of black-on-white pottery showing a design of wavy hachure

(fig. 112, *j*). It is pretty certainly Pueblo II but not immediately identifiable as to type.

MISCELLANEOUS OBJECTS OF CLAY

Heavy-walled Vessels: Fragments of these have already been shown from other sites, but here for the first time do we come into a horizon where this peculiar type of object was common. The two from Los Guanacos were found in connection with the groups of animal figurines described below. The first (fig. 112, *a*) is of the simplest form. The diameter is 4 inches while the body is about an inch thick. The second (fig. 112, *b*) is of the effigy type, the head and tail have been broken off. Both of these contained charcoal indicative of their possible use as censers. A large and varied collection of objects of this type has been found by the Van Bergen-Los Angeles Museum Expedition's work at the Grewe site near Casa Grande,⁴ and also at Snaketown.⁵

Figurines: Plate 82, *a* shows an unusual collection of fired clay animal figures found below the floor of a Los Guanacos hut. It was

these which gave the ruin its name. With them were found the heavy-walled vessels just described, concretions, paint, and a small vessel with a perforated bottom. The latter is no longer in the collection. Cushing writes that the fifteen animals, nearly all complete, were "disposed precisely as would be a modern sacrifice of the kind in Zuni."⁶ It is undoubtedly true that the Los Guanacos figurines were used symbolically in some form of fertility rite. If the toys of children, they would certainly not have occurred with the other objects of a sacred nature in the manner stated. The appearance of broken but similar effigies in other sites, namely Los Hornos and Casa Blanca, indicates that the practices pertaining to these were not confined to Los Guanacos. If the animals are deer, as it is believed, their use in rites of productive magic would reflect a certain dependence upon the deer for food and

³ Probably Santan Red (Gladwin, W. and H. S., 1933, pp. 28-29).

⁴ Woodward, 1930.

⁵ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 171, *et seq.*

⁶ Cushing, 1890, p. 177.

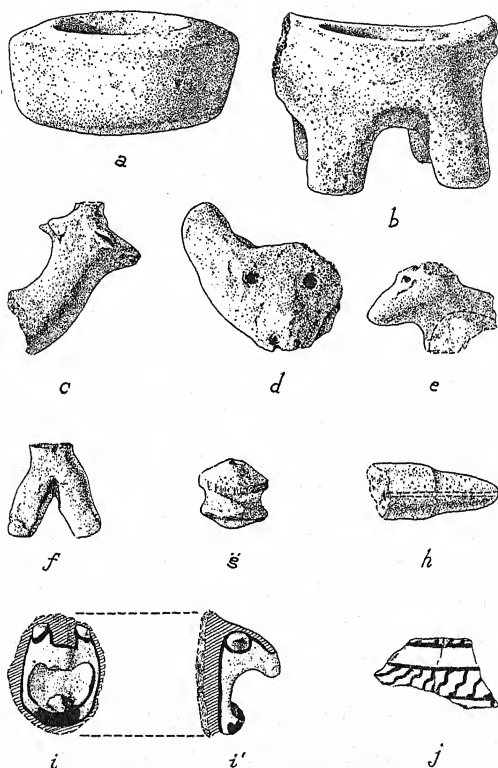


FIG. 112. Los Guanacos. Miscellaneous clay objects.
Diameter of *a*, 4 inches.

by-products, a fact which deer bones in the refuse tend to verify.⁷

All but two of the animals are so nearly duplicates of each other and show the same peculiarities that they were without question made by the same individual. These average about 5 inches in length. The modeling is not

particularly well done and they were not smoothed by any other means than the hand; there is no painted decoration. Nearly all are shown with the muzzle thrown slightly upward and forward (pl. 82, *d*, *e*) excepting one in which the head is turned to the side (pl. 82, *b*). In all cases the mouth is indicated by a

⁷ Parsons, 1919, pp. 279-286, discusses "increase by magic" rites as practised by the Zufii and cites the Los

Guanacos figurines among others from ruins as plausible evidence for the antiquity of the custom.

shallow slit, the nostrils with pits, and the eyes are circular as though made with a hollow reed. One figurine differing somewhat from the others has the "coffee-bean" type of eye—a grooved button of applied clay—and an erect tail (pl. 82, *c*), while the second example also has an erect tail but none of the facial characters are indicated. It is, of course, impossible to say what animal was being represented, but as intimated above, the chances are in favor of deer. Nearly all of the images are smoke blackened to a lesser or greater degree, apparently since the initial firing.

In addition to the above, there are fragments of six other figurines of the same general nature. One (fig. 112, *c*) is obviously that of a young male deer as the spikes are well shown. This head also has the pinched-up and grooved eyes. Figure 112, *d*, the head of another animal, is larger than the average as it measures about 3 inches across. It bears somewhat more resemblance to a mountain sheep. The eyes, unlike all others, are deep round gouges made with a blunt tool. Image *e* lacks all face markings but has instead a deep slit in the middle of the forehead. All other heads have been broken from presumably complete animals, while this specimen, except for the ears and a part of the neck, is complete in itself. The neck has a

hollow in it large enough to insert a finger.

The animal images of Los Muertos (fig. 70) were not only smaller but much inferior in modeling to those from Los Guanacos. If the figurines from these two sites are related, in that they were the paraphernalia of similar rites, a degeneration is certainly indicated for the Classic Period.

Figure 112, *f* is probably the lower portion of a human figurine, the only image with human features from Los Guanacos.

Spindle Whorls: There are two, both of the pulley type. The first is of the thin subtype and the second (fig. 112, *g*) is thicker and differs from those noted for Los Muertos in having convex sides. The perforated potsherd discs are also present.

On the basis of these two whorls it looks as though they first appeared in pre-Classical times, although I know of no examples from Colonial villages.⁸

Pipe: What is undoubtedly the stem of a clay pipe is shown in figure 112, *b*. It is 2½ inches long and has a maximum diameter of ⅜ inch at the broken end whence it tapers towards the mouthpiece. The latter is distinguished from the body, as it were, by a slight shoulder. The bore is very small, being less than ¼₁₆ of an inch in width.

OBJECTS OF STONE

The stone industry of Los Guanacos does not present the marked contrasts with the Los Muertos stone work that was evident in the pottery. For that reason, only brief attention need be paid.

Projectile Points: There are twelve: three with stems of the type shown in plate 81, *a*, one with a rudimentary stem (pl. 81, *b*), three of triangular form with deeply concave bases (pl. 81, *c*), and five with broad straight bases and serrated edges (pl. 81, *d*). It is to be noted that the stemmed points with shallow notches far from the base (see pl. 35, *a-e*) are absent which verifies the feeling expressed before that this was a late or Classic characteristic. For the remaining types the evidence is not so clear.

⁸ Two examples were found at Snaketown (Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CCXIII,

Mortar and Pestle: The field record makes mention of a mortar but the specimen cannot be located; a single pestle is of the type shown in plate 34, *c*.

Axes and Adzes: The average length of the eight complete three-quarter grooved, single-bitted axes is 6 inches. This is slightly under the average length for Los Muertos axes. The workmanship appears to be somewhat less expert than in Los Muertos axes, but one cannot be sure that the samples are typical.

The collection also contains one double-bitted axe (length, 5¾ inches) and one adze (length, 4½ inches).

Crusher: The pierced lava boulder illustrated in plate 81, *b* is the same form of tool as

1, *m*). Although unplaced as to phase, I believe the trait to be late, i.e., Sacaton Phase.

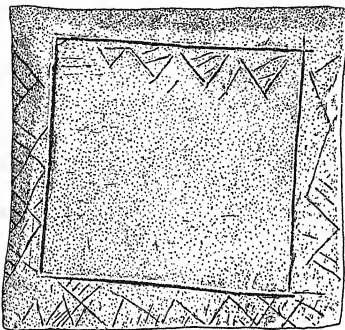
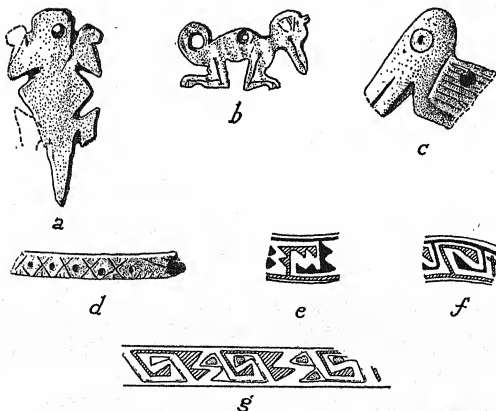


FIG. 113. Los Guanacos. Slate palette. About 3 inches square.



RED PAINT
 TURQUOISE
 BLACK

FIG. 114. Los Guanacos. Carved shell pendants (a-c); bracelet fragment (d); fragments of engraved and painted rings (e, f); inlaid and painted design on shell ring (g) shown in frontispiece. Length of a, 1½ inches.

found in Los Muertos, although it is considerably smaller. The bottom portion shows some evidence of wear.

Slate Palette: A single complete example (fig. 113) and several fragments make up the collection. The Sedentary Period type is represented.

OBJECTS OF SHELL

For Los Muertos we saw that a considerable number of marine shell species, twenty-three to be exact, were variously used for objects of ornament. In Los Guanacos this number is reduced to seven. The genera present, listed in the order of their abundance, are: *Glycymeris*, *Cardium*, *Dosinia*, *Pecten*, *Comus*, *Olivella*, and *Vermetus*. Some doubt may be expressed as to the adequacy of the sample, as during the Sedentary and late Colonial Periods more species were normally present.

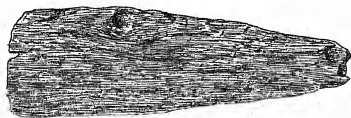


FIG. 115. Los Guanacos. Spatulate tool of ironwood. Length, 6 inches.

The finished products of Los Guanacos are also less numerous and less diversified than those of Los Muertos. Yet the essential features are present. There is a notable lack of whole shell and disc beads but doubtless this is to be

Pigments: The usual assortment of yellow, red, white, and green pulverized pigments were found. A new feature appears, however, in the form of crayons (pl. 81, *e-g*), all of green color. The pulverized pigment — malachite — seems to have been mixed with an adhesive base and then molded by hand into the stick form.

attributed to the fact that the cremation plot, where such items are usually found, was not discovered. Whole shell and cut shell pendants both occur, the latter consisting of the familiar type of reptile, mammal, and bird forms (fig. 114, *a-c*). There is also an example of the conventionalized bird as shown in figure 94, *b*. Bracelet fragments are numerous, although it may be noted that there are none with the frog motive and one bracelet section has an incised pattern (fig. 114, *d*). In rings, both the thin type of *Glycymeris* shell and the band type of *Comus* shell occur. In the latter class there are two fragments with engraved patterns (fig. 114, *e, f*), the designs being further accentuated with red and black paint. There is also a complete ring with turquoise inlay (see frontispiece *e* and fig. 114, *g*) of the same type first encountered in Los Muertos. If this ring is accepted at face value as a product of the Sedentary Period, it will have to be admitted that inlaying was already practised at that time. But the complete lack of the technique at Snaketown arouses the suspicion that this specimen, like the large Salt Red jar, may date from a later horizon.

OBJECTS OF BONE

The only food bones from Los Guanacos are those of the mule deer. Bone tools consist of two splinter awls, one short awl of a deer meta-

tarsus, and two fragmentary long examples of the same type.

PERISHABLE OBJECTS

WOOD

These include several paddle-shaped tools as described for Los Muertos all of which are in an advanced stage of decay. There is also one object of spatulate form (fig. 115) of ironwood.

TEXTILES

A half dozen small pieces of cotton textile were preserved by contact with a quantity of pulverized malachite paint material. Two weaves are represented: (a) plain, and (b) twill.

Plain weave fabrics include two grades: a tightly woven cloth with 28 warp and 24 weft per inch, and a more coarsely and less tightly woven cloth with 24 warp and 20 weft per inch.

The twilled pieces are all from the same fabric. A fancy type of twill weave, involving the use of differentially colored warp and weft yarns, was employed. What the colors originally were cannot be accurately determined. One was certainly brown and the other was probably white, now considerably discolored. Brown yarns are double stranded, laid up in a clockwise fashion; white yarns have triple strands and were twisted together counter-clockwise. This difference in the direction of twisting is a rather odd feature, as normally it is consistently one way or the other. The warp web was stretched of alternate pairs of brown and white yarns. The weaving was then carried on with a regular interchange of five white and five brown threads. The five white picks were inserted in an over-two-under-two echelon weave, but at the change of color this rhythm was broken by skipping forward a

thread, then continued again in the normal form. Each alternation of color is thus accompanied by a slight shift of the weave. The re-

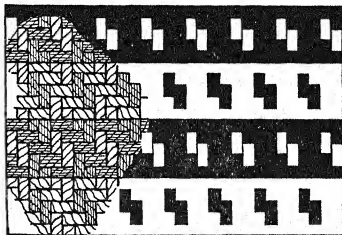


FIG. 116. Los Guanacos. Fragment of fancy twill and reconstructed design. Slightly enlarged.

sult is a striped pattern with small motives brought out in these bands in opposing colors by the warp yarns, as will be seen from the drawing in figure 116. Due to the multiple stranded warp and weft yarns the fabric is coarse, there being about 16 of each per inch.

LOS HORNOS

Near the eastern spur of the Salt River Mountains, some five miles northwest of Los Muertos, lies La Ciudad de Los Hornos—"The City of the Ovens" (fig. 1).⁹ Cushing has the following to say about Los Hornos in his incomplete report:

"On reaching the mound we found that, like the central mound of Los Pueblitos [see p. 186], it was a huge mass of debris from a once towering and extensive structure, and that it was surrounded to an almost equal extent by the characteristic elevations I have before described. The mound itself has been somewhat excavated by prospectors who, dreaming of buried treasure—gold and silver—had even gone so far as to 'locate' a part of this ruin site as a mine. Their works, however, had not yet proven destructive to any extent, and outside of the great mound itself happily no excavating had been done, with but a single exception wholly to our advantage. . . . I learned afterward . . . (that they) had cleared out a rather

remarkable subterranean structure, twenty or thirty rods west of the great mound. It was an enormous, funnel-shaped, burned and blackened kiln-like cavity, carefully formed of fire-clay and natural cement which showed the action of innumerable fires. I could not, without much additional excavation, examine into the details of this, but it at once struck me as being a clan or tribal roasting pit, or, as I shall show later, possibly a furnace not unlike the underground corn ripening ovens of the Zuñis and the pits for baking mescal of the Apaches and more southern tribes. . . ."

On this same visit, Cushing also located several other similar pits and it is to these the name of the village refers (fig. 117).

We do not know the extent of Los Hornos. Specimens are recorded as having come from eight mounds, including a large one. According to present-day criteria, the massive mounds were a late (Classic) feature, and one might expect to find at such a site the traces of Pueblo

⁹ "Casa de Loma" on Turney's map, 1924, pp. 6-7.

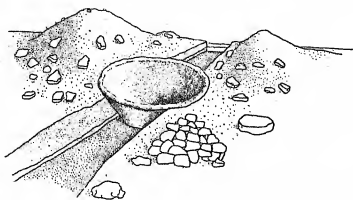


FIG. 117. Los Hornos. One of several pit ovens which gave Los Hornos its name. Diameter, probably about 5 feet.

as well as Hohokam occupation. This is the case, for not only are there traits of Classic Hohokam origin, but also burials accompanied

by late-looking red ware and a nearly complete bowl of Gila Polychrome. Nevertheless, it must be remarked that most of the potsherds and many of the 600 specimens collected are certainly earlier. Judged purely on the basis of the limited material brought back from Los Hornos, one may say that its occupation began in late Colonial or early Sedentary times and carried on into the Classic Period long enough to receive increments of the Pueblo group. This fact, and the scattered digging which the Hemenway Expedition must have done here, accounts for the mixture of early and late material in the collection. In the following paragraphs only such of the specimens as appear of importance will be taken up since a full discussion would only duplicate what has been said before.

POTTERY

RED-ON-BUFF

There are but two whole vessels. The first is a flare-rimmed bowl (pl. 83, *b*) of Santa Cruz Red-on-buff. The interior decoration has been almost completely destroyed by an excessive secondary burning. Additional rim sherds of the same type of bowl showing characteristic patterns will be seen in plate 84, *c, d, g*. The second vessel (pl. 83, *a*), a low wide-mouthed container, is also Santa Cruz Red-on-buff. Sacaton Red-on-buff (pl. 84, *a, b, e, f, h-n*), Gila Butte Red-on-buff (pl. 84, *u*), and Snake-town Red-on-buff (pl. 84, *o-t*) are present.

POLYCHROME

Miscellaneous sherds and a nearly complete bowl of Gila Polychrome found with a burial

constitute the entire collection of this type from Los Hornos.

RED WARE

Of the eight vessels of Salt Red in the collection, seven are bowls and one is a scoop, any one of which might easily have come from Los Muertos.

INTRUSIVE SHERDS

These consist of a Tusayan Black-on-red¹⁰ bowl, dating from about 850 to 1125 A.D., and a large piece of a Roosevelt Black-on-white pitcher of late Pueblo III date from the Roosevelt Lake area.

MISCELLANEOUS CLAY OBJECTS

Miniature Vessels: There are two: a 2½-inch jar containing white paint and a still smaller specimen (fig. 118, *a*). Both are of plain ware.

Griddle: The two fragments are of the same type as described for Los Muertos, showing the mat impression on the underside. Data on the associated material are not given.

Perforated Plate: Plate 85, *a* is the only complete example of this kind in the collection, although numerous fragments were reported from Los Muertos. This plate is 6 inches in diameter with perforations ½ inch from the rim, made from inside while the clay was soft. The paste is like that in red ware, the surfaces are unslipped, and only the interior is polished.

¹⁰ Colton and Hargrave, 1937, pp. 74-75.

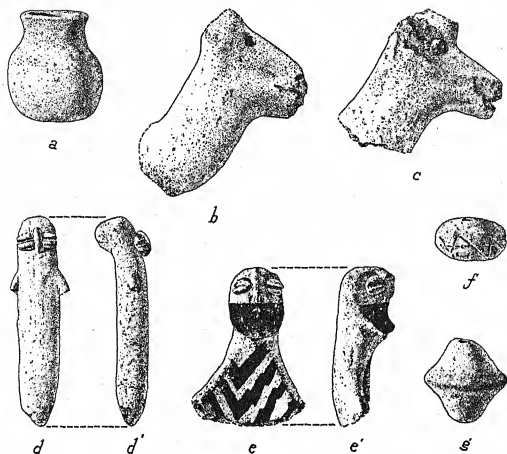


FIG. 118. Los Hornos. Miscellaneous clay objects. Length of *d*, 3 inches.

Figurines: The first of two human figurines from Los Hornos is shown in figure 118, *d*. It has a marked similarity to one described from Los Muertos (fig. 69, *b*). The body is formed of a simple bar of clay showing no attempt whatever at representing bodily proportions. Near the upper end there were added individually a narrow pellet of clay for the nose and two "coffee-bean" pellets for eyes. Frail arms were also added to the body, both of which are broken off, and a lump of clay was added to the back of the head.

The second Los Hornos figurine formed the handle of a red-on-buff scoop (fig. 118, *e*). The prominent nose, instead of being separately added, as on the foregoing image, was here pinched up from the base; the nostrils are

shown, and the eyes are of the normal applied form. The lower half of the face is painted red. This type of face was well established during the Santa Cruz Phase.¹¹

The animal figurines (fig. 118, *b*, *c*) consist of three heads from the same class of effigy as the Los Guanacos "herd."

Spindle Whorls: In addition to a large number of perforated sherd discs, some of which were doubtless used in spinning, there are nine specialized whorls. These fall into the following types: one spheroidal; one discoidal (thick); five ellipsoidal, one of which bears a crude zig-zag and punctate pattern about the edge (fig. 118, *f*); and two biconical, one having a pronounced ridge about the middle (fig. 118, *g*).

OBJECTS OF STONE

What has been said of preceding sites regarding their stone work may be practically repeated here. All the major categories of objects occur, including: arrow points, manos, various sorts of rubbing stones including one of

the round type with a shallow channel about the edge, hammerstones, axes, one adze, hoes (all unnotched), one crusher, lava pulley-shaped rings, and other articles which are listed below.

¹¹ Gladwin, Haury, Sayles, and Gladwin, 1937, pl. CXC VII.

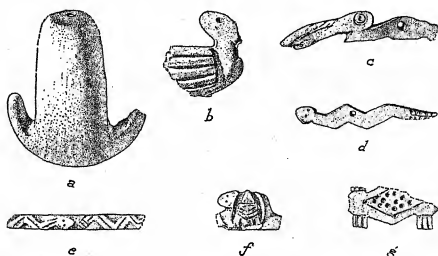


FIG. 119. Los Hornos. Carved shell objects. Length of *a*, 2 1/4 inches.

Arrow Shaft Straightener: Although alike in material and general form with tools of this type described for other sites, the Los Hornos example (pl. 86, *b*) has a pair of diagonally placed grooves. A third cut—the beginning of a groove—was never used. The ridges between grooves over a short distance have been roughened with shallow incisions, and lateral scratches in the lower troughs have been added, possibly to roughen it.

Slate Palettes: The three whole palettes are shown in plate 86, *i-k*. The scratched patterns on the raised edge are typical of Sacaton Phase palettes.

Stone Balls: The collection has an unusually well-made ball of crystalline rock, 2 inches in diameter, and another made of tuff, lightly marked with an encircling groove near the middle (pl. 86, *g*).

Lava Vessel: Plate 86, *a* is a small cup of very porous lava 2 1/4 inches in diameter.

"Medicine" Stones: Two variations over those already illustrated from other ruins are shown in plate 86, *b, c*. The first example is square, 2 1/4 inches long and has a single groove; the second is somewhat shorter and has two grooves near the large end. Both are made of porous lava.

Pendants: Plate 86, *e* is a fragment of a small schist pendant showing a central rectangular area which has been slightly cut out, as in the slate palettes. A small stearite bird carving (pl. 86, *f*) closely patterns those from Los Muertos. This example is but 1/8 inch long.

Bracelet: Heretofore all bracelets were found to be of shell, but the fragment illustrated in plate 86, *d*, cut from a soft dark-greenish stone, indicates the use also, although rarely, of stone bracelets.

OBJECTS OF SHELL

The outstanding shell objects are illustrated in figure 119: *a* is a conventionalization of the frog (there are also bracelets with carved frogs); *b* and *c* are bird pendants (pelican ?); *d* is a clear-cut representation of a rattle snake;

while *g* is a fragment of a familiar form of reptile pendant; and *e* is a bracelet piece also with reptilian motives. Specimen *f*, also from a bracelet, is a standard Hohokam way of combining a bird and a snake.¹²

OBJECTS OF WOOD

Among the eight decayed ironwood tools, there is but one outstanding example—a broad

bevel-edged paddle (fig. 120).

¹² Compare with Gladwin, Haury, Sayles, and Gladwin, 1937, fig. 56.



FIG. 120. Los Hornos. Wooden paddle-shaped tool. Length, $8\frac{1}{2}$ inches.

COPPER BELL

The Expedition was fortunate enough to find in Los Hornos a corroded copper bell (pl. 85, *b*, *b'*). Like most Southwestern bells, this is of the "sleigh-bell" type, with a slitted spherical resonator and an eyelet for suspension. The body is $\frac{3}{8}$ inch in greatest diameter and is somewhat compressed out of shape. The walls are about $\frac{1}{32}$ inch thick. The upper part of the body exhibits a faint suggestion of a spiral ribbing in the vortex of which rises the eyelet. The latter is $\frac{3}{8}$ inch in diameter, fixed to the body at right angles to the axis of the slit, and has a small projection rising from the upper margin. The clapper consists of a $\frac{1}{4}$ -inch rounded pebble apparently put in the bell before the lips of the slit were bent together.

This bell, like others from the Southwest, Mexico, and Middle America, was cast by the lost-wax method. The analysis¹³ of the copper in the Los Hornos bell shows, in addition to copper, .1 of silver, .001 of lead, and .1 of iron. This is unusually pure copper as the total of foreign ingredients is less than .3 of one per cent, whereas some bells from the Southwest are known to have as high as 2. of silver alone. The records do not show where and under what circumstances the Los Hornos bell was found, but it must have come either from the Sedentary or Classic Period deposits. Bells from the Sedentary Period¹⁴ are well authenticated but earlier examples have not been reported.

OBJECTS OF BONE

The same dearth of bone objects exists in Los Hornos as for previous sites. There are but three incomplete examples of splinter awls.

The only other bones brought back consist of a partial dog skeleton found in association with a funerary jar. The late Dr. Glover M. Allen has identified this animal as belonging to

the smaller variety of Indian dog,¹⁵ and he expresses the opinion that it was probably identical with the small dog possessed by the Basketmakers. As the several forms of the small variety of Indian dog had a wide distribution, no direct cultural connection is necessarily implied by the above similarity.

¹³ By Dr. W. C. Root, courteously supplied me by Dr. A. M. Tozzer.

¹⁴ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 163-165.

¹⁵ Allen, 1920, pp. 481-490.

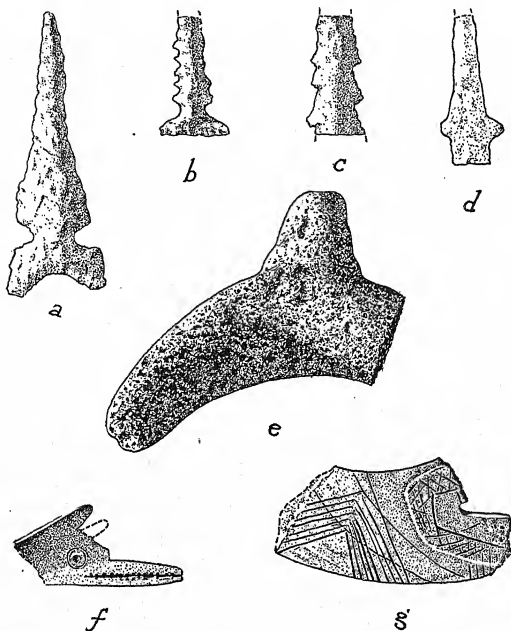


FIG. 121. Las Canopas. Stone and shell objects. Length of *a*, 2 1/4 inches.

PUEBLO DE LAS CANOPAS

About 6 miles west of Los Hornos and 3 miles south of Phoenix on the south bank of the Salt River (fig. 1) there was located a ruin known to the Hemenway Expedition as Pueblo de las Canopas. According to Turney¹⁸ there is no trace of this village today. He notes the position of the ruin under the name of Pueblo Viejo. The etymology of the word Canopas is not known.

The Expedition's activities here were apparently quite limited, as less than 200 specimens

were entered in the field register. Most of these, especially the pottery, can be definitely allocated to a pre-Classical horizon, although, as in Los Hornos, a small quantity of Gila Polychrome and Casa Grande Red-on-buff sherds is indicative of a later phase of occupation somewhere in the vicinity. The collection duplicates that of Los Hornos to so great a degree that mention only of some of the more significant factors will be made in the following brief paragraphs.

¹⁸ Turney, 1924, pp. 6-7.

OBJECTS OF STONE

Projectile points include six stemmed specimens, an unusually long one ($2\frac{1}{4}$ inches) with concave base (fig. 121, *a*): one with rudimentary or tangless stem, two triangular with concave base; three unstemmed with flat base and serrated edge, one of which (fig. 121, *b*) has strong lateral projections, and one fragmentary barbed point (fig. 121, *c*). There is also an incomplete drill point of chalcedony (fig. 121,

d). It should be noted that the stemmed points with notches far from the base — a late type — are lacking.

"Medicine" Stone: Figure 121, *e* shows a portion of a crescentic lava object slightly over 2 inches in length. It undoubtedly belongs in the same class as the straight grooved stones referred to before under "Medicine" Stones from Los Hornos.

OBJECTS OF SHELL

The shell species of Las Canopas coincide with those of Los Gúanacos. The collection contains miscellaneous whole shells, a curved needle, a small number of geometric pendants, differing in no way from those of Los Muertos,

several broken effigy pendants (fig. 121, *f*), numerous bracelet fragments, and one piece of a broad carved bracelet (fig. 121, *g*) in the same style as found in the Grewe site by the Van Bergen-Los Angeles Museum Expedition.

MISCELLANEOUS RUINS

IN ADDITION to the major work done in ruins already listed, the Expedition made small collections—chiefly objects found on the surface or the product of summary digging—on such sites as were visited or seemed to be of interest. These include ruins both in the Salt and Gila valleys and one in the Tortillita Mountains north of Tucson. In some instances

there is no reference to the location of the site. However, all villages and such artifacts as seem of importance will be mentioned in order to make this record of the Expedition's work as complete as possible. In all cases the ruins received Spanish names, some of which have not survived into current usage or have been replaced.

PUEBLO DEL PATRICIO

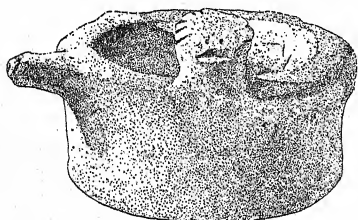


FIG. 122. Del Patricio. Thick-walled effigy vessel.
Diameter, $3\frac{1}{2}$ inches.

On the eastern outskirts of what was then Phoenix (fig. 1) the members of the Expedi-

tion met with a series of small mounds. These were located on the land of Mr. Herbert R. Patrick¹ in whose honor the ruin was later named. As far as I can learn, this group of mounds has since been completely leveled and submerged under modern buildings.

The few specimens gathered on the surface and those presented to the Expedition by Mr. Patrick are too inadequate to give much of an idea of the period of occupation. Two jars and two bowls, Salt Red and Salt Smudged, are of the type found in Los Muertos. A thick-walled effigy (horned toad) vessel (fig. 122) is suggestive of an older occupation. This vessel shows traces of a red exterior decoration. Figure 123, *a* is a fragment of a carved shell pendant, also from this ruin.

LA CIUDAD DE LOS PUEBLITOS

"The City of Little Towns," generally spoken of as Los Pueblitos by the members of the Expedition, was situated about 2 miles east and slightly north of Phoenix (fig. 1). The name of the ruin has since been changed to "Ciudad Phoenix"² and is commonly referred to as "La Ciudad."³

Cushing records in his unfinished report that from the top of the largest mound, twenty-eight lesser mounds were visible. These were

scattered over the better part of a square mile. Except for random testing, no work was done here and the collection is correspondingly of little importance.

The decorated pottery—all sherds—includes the familiar polychrome types described for Los Muertos and the red-on-buff is likewise chiefly of the Classic form. There is a single bowl of Salt Red and a plain ware plate fragment with perforations near the edge. Intrusive

and was the result of an interest aroused by the archaeological features of the valley.

¹ See Turney's map, 1924, pp. 6-7.

² To Mr. Patrick, a surveyor by profession, we are indebted for the first map, and a short article (*The Ancient Canal Systems and Pueblos of the Salt River Valley, Arizona*) concerning the old canals in the vicinity of Phoenix and Tempe. This appeared in 1903

³ Extensive excavations have been carried on here by the Heard Museum of Phoenix, where objects from the site may be seen.

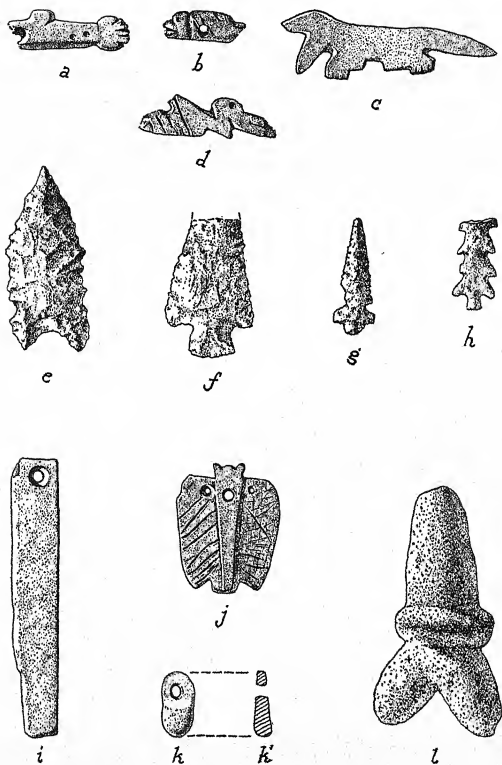


FIG. 123. Miscellaneous objects. Pueblo del Patricio (a); Los Pueblitos (b-d); Las Piedras (e-l). Length of i, 2¼ inches.

potsherds include two fragments of Tularosa Black-on-white and three other black-on-white pieces not placed but dating from Pueblo III or later.

The stone artifacts include eight stemmed and three unstemmed arrow points all of which can be duplicated from Los Muertos and two tangless stemmed points as described for Las Acequias. There is also one fragment each of a "crushing" stone and a "pulley-shaped" stone.

A small animal carving of red stone analogous to pipestone will be seen in figure 123, b.

Shell articles are represented by numerous fragments of bracelets, one frog, and the two effigy pendants shown in figure 123, c, d.

Los Pueblitos was obviously closely allied to Los Muertos and it is hoped that fuller information will be forthcoming as the result of the work conducted there by the Heard Museum.

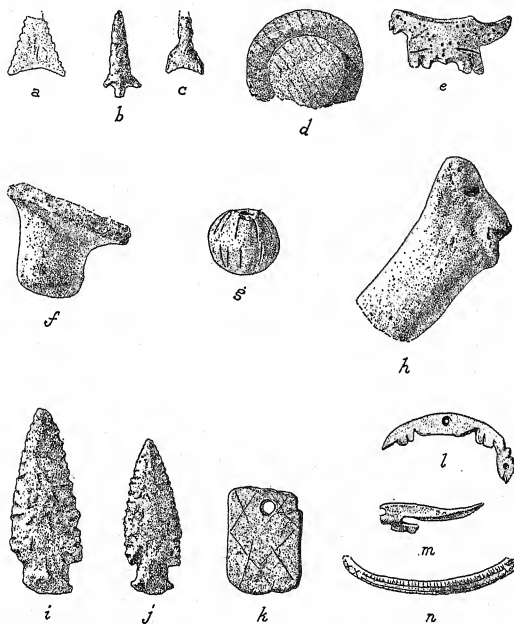


FIG. 124. Miscellaneous objects. Pueblos Arriba (a-e); Casa Blanca (f-n).
Length of *b*, 2½ inches.

EL PUEBLO DE LAS PIEDRAS

The location of this village is not known nor is anything said of its extent. As the above name implies, stones were used in the construction of walls. This is an uncommon feature in the Salt River Valley, although Pueblo Grande, a very imposing site about 5 miles east of Phoenix, does have rock construction. Whether or not Las Piedras was the Expedition's name for Pueblo Grande cannot be told, but the fact remains that no other site visited could possibly be mistaken for Pueblo Grande, and it is not plausible that so conspicuous a ruin as

Pueblo Grande escaped Cushing's attention.⁴

No pottery whatever was returned from Las Piedras and the collection of stone and shell consists of such objects as were picked up from the surface. The most noteworthy of these are shown in figure 123, *e-l*: *e* and *f* are projectile points—the first triangular with concave base and the second stemmed—of much larger form than are ordinarily found in the region; *g* is a type with a "trefoil" stem occasionally seen in the region but unrecorded for Los Muertos; and *h* is a fragment of the typical

Phoenix which has been sponsoring its exploration under the direction of Mr. O. S. Halseth.

⁴ Pueblo Grande is now the property of the City of

Santa Cruz Phase form of barbed point. Example *i* is a slender schist pendant $2\frac{3}{4}$ inches long, and *j* is an effigy pendant of what looks like an owl, made of the same material. Two steatite birds of the type shown in figure 85, *c-e* were also found. Specimen *l* is another one of the questionable "medicine" stones of lava (length

$2\frac{1}{2}$ inches), which differs from previous examples in having a divided or forked end and a raised ridge at the point of branching.

The only item of interest among a limited amount of shell articles is a bi-lobed bead (fig. 123, *k*).

LOS PUEBLOS ARRIBA

Just across Salt River to the north of Tempe on the slopes leading up to some low rock outcrops, there occur a number of small sites. It is probable that these are the ones referred to as Los Pueblos Arriba — the "high villages."

All sherds from these are Casa Grande Red-on-buff and Gila Polychrome. The arrow points include two of the stemmed variety with notches near the base, four of the broad-based type with deeply serrated edges, and three are triangular with concave base. One of these,

made of milky quartz, is shown in figure 124, *a*; example *b* has a rudimentary stem and flaring barbs (length $1\frac{1}{2}$ inches); and *c* has a small point with a large flaring stem. The two shell items of note are first, a disc $1\frac{1}{2}$ inches in diameter with a zone around the edge cut away to a depth of $\frac{1}{16}$ inch below the central area (fig. 124, *d*). This was undoubtedly used as a base for mosaic work. The second example is a shell carving of an animal (fig. 124, *e*) dotted with shallow drilled pits.

OTHER SALT RIVER VALLEY SITES

La Ciudad de la Mesa, or Casa de Mesa as given by Turney,⁶ located at the southern edge of the present town of Mesa, and Pueblo del Juan (now Pueblo Ultimo),⁶ located about 5 miles north and west of Mesa on the north

bank of Salt River, were also visited but no work was done. Las Hediondias was the name of another site of unknown location. The name was derived from "hediondilla," referring to the desert creosote bush.

CASA GRANDE⁷

Although the Hemenway Expedition did not undertake excavations at Casa Grande, about sixty specimens of various sorts were collected

there during a visit by Cushing. With the exception of a single crematory urn, they were surface finds. A few are worthy of attention.

POTTERY

Figure 125, *a* is a Casa Grande Red-on-buff jar, a diagnostic type of the Classic Period.

Intrusive sherds from the surface include the following: Roosevelt Black-on-white, Pinedale Polychrome, and Ramos Polychrome.⁸

⁶ Turney, 1924, pp. 6-7.

⁶ Turney, 1924, pp. 6-7.

⁷ Casa Grande National Monument lies in the Gila Valley, 57 miles southeast of Phoenix and about 35 miles in the same direction from the former site of Los Muertos. This well-known ruin is situated a short distance south of the Gila River. Occupation here began early and persisted through to the Classic-Pueblo IV Periods. To this latter phase is to be at-

The object shown in figure 125, *b* is a piece of fired clay shaped somewhat like a truncated cone. Its greatest breadth is $1\frac{1}{4}$ inches and the thickness is 1 inch. The head, i.e., the largest flat surface, shows a considerable amount

tributed the impressive "big house" of the Monument. The culture history of Casa Grande and Los Muertos shows that they were sister cities, the latter probably having the largest population. For the best works on the remains at Casa Grande and vicinity the reader is referred to: Bandelier, 1892; Mindeleff, 1896b; Fewkes, 1909, 1912; Kiddler, 1924; Gladwin, 1928; Gladwin, H. S. and W., 1929a; Woodward, 1931; Pinkley, 1931.

⁸ Sayles, 1930, pp. 45-54.

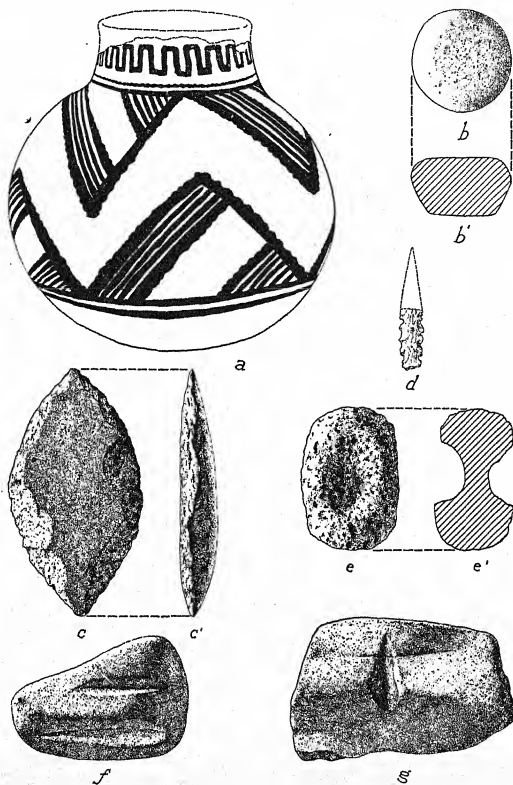


FIG. 125. Casa Grande. Miscellaneous objects. Diameter of *a*, 6 inches.

of a peculiar type of wear best described as pitted. This is not the result of hammering but conceivably derived from the object's use as an anvil in pottery making. Through extended use of this sort it is probable that the softer bodies of clay of the anvil between the hard and coarse bits of tempering material would eventually be worn away.

⁹ Peabody Museum of American Archaeology and

Although the Hohokam habitually made paddle-and-anvil pottery, it is clear from the Hemenway Collection and other archaeological work done since, that specialized potter's anvils, such as the mushroom type found in Tennessee,⁹ for example, were not prevalent in the Gila Basin. Doubtless water-rolled pebbles were used then as among the Pima of today.

Ethnology, Harvard University, nos. 78-6-10/15908,

OBJECTS OF STONE

Figure 125, *c* is a rough double-pointed blade chipped from a flake of compact stone. Except for the lack of hafting notches, it resembles the Los Muertos club heads.

A fragmentary arrow point (fig. 125, *d*) is an added example of the Colonial Period barbed form previously encountered.

Figure 125, *e* is a small block of porous lava $2\frac{1}{2}$ inches long and deeply pitted on both sides. It is probably an abrading tool. Figure 125, *f* and *g* are arrow shaft smoothers, the only ones in the collection made of abrasive stone, namely tuff. Both blocks have also been used for other purposes.

CASA BLANCA

The name Casa Blanca — "White House" — is undoubtedly derived from the fact that some of the large ruin mounds, when free of vegetation, appear from a distance as whitish areas. This ruin is located some distance below Sacaton on the south side of the Gila River. Casa Blanca and a ruin at Santan, north of the Gila, are said to be the only large ruins near which the Pima had villages when first seen.¹⁰ Apparently little more than a visit was paid Casa Blanca by the members of the Hemenway party.

Ceramic objects from here include a small Casa Grande Red-on-buff pitcher, a short stubby leg of a footed vessel (fig. 124, *f*) — a feature which is not frequently found except in the Sedentary Period — the modeled head

of an animal figure with slit eyes of the general type already described from Los Guanacos (fig. 124, *b*), and a clay spindle whorl one inch in diameter of the spheroidal type showing a simple incised decoration (fig. 124, *g*).

Among the stone articles there are two large points (fig. 124, *i*, *j*) which contrast sharply with the small delicate points usually seen, a rectangular schist pendant with a simple scratched pattern (fig. 124, *k*), several thin discoidal whorls and a fragment of a slate palette.

Figure 124, *l-m* illustrate the best of the shell specimens, the first being of particular interest as it is a reptile made over from a bracelet fragment; the second is a broken pendant of indeterminate form, and the last is a section of an engraved bracelet.

PUEBLO DE LAS CENIZAS

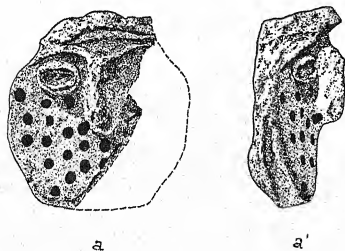


FIG. 126. Las Cenizas. Fragment of effigy head used as appliqué decoration. Length, 2 inches.

Burrowing animals frequently bring to the surface quantities of ashes in and about ruins.

78-6-10/15909, 79-4-10/17255. See also Gifford, 1928, for other examples. Attention should be called to a mushroom-shaped anvil from a Colonial Hohokam

The inspiration for the name "Cenizas" — meaning ash — is probably to be attributed to this. Las Cenizas is situated on the south bank of the Gila River a short distance above Casa Blanca, but as mounds are more or less continuous along the river, the specific mound can probably not be identified.

Only one specimen of real interest was found here. This is a modeled human face (fig. 126). It formed an appliqué decoration on a red-on-buff vessel and itself is decorated with red polka dots. The eyes are of the typical "coffee-bean" form and the prominent nose is pinched up from the rather disc-like face. Typologically, the specimen may be dated to the Santa Cruz Phase.

site (Roosevelt:9:6) in the Tonto Basin, Haury, 1932, pp. 95-97.

¹⁰ Russell, 1908, p. 24, footnote *d*.

LA PRESA ANTIGUA

This ruin is located in the Tortillita Mountains about 80 miles southeast of Los Muertos and 25 miles north of Tucson. The name suggests that the site was near a canal or a reservoir. Judging from the pottery which is

predominantly red-on-buff, the period of occupation of this ruin is comparable to that of Los Hornos and Las Canopas. A few sherds of Gila Polychrome were also collected from this site.

CAVE WORK

SOUTHERN Arizona has few caves large enough to invite permanent occupation. In the volcanic hills, however, occasional small caves are found, some of which bear evidence of use by man as shrines where articles of sacrificial and offertory nature sometimes were deposited.

Although cave exploration was apparently not a part of the program of the Hemenway Expedition, its members did, on occasion, examine these sacred spots and from two such places — Double Butte Cave and a cave in the Superstition Mountains — collected a limited amount of material.

DOUBLE BUTTE CAVE

Less than one mile north of Los Hornos, two volcanic hills rise from the flat valley floor. These were known as the Double Butte.¹ On an early visit to Los Hornos, Cushing determined to examine the volcanic outcrop as the possible location of a shrine, for, as was his custom, he placed much reliance on the distribution of these according to the mythical regions — north, east, south, and west. Cushing thought Double Butte, being to the north of Los Hornos, might be the logical place for a sanctuary and this he subsequently found and excavated. Unfortunately, a large part of the dry refuse collected in the cave had been burned, so that the specimens gathered here had to be procured in small pockets which lay beyond the reach of the fire. The purely sacrificial nature of the material is brought out in the following pages. But before passing on to the descriptive part, it is well to say a word concerning the age of the material from the Double Butte site.

This is at best a difficult task because shrines are often subject to prolonged use and some caves, indeed, may have indubitable historic material mingled with other objects of much earlier origin. Pottery, the most desirable

indicator of age, was very meagerly represented. The few sherds recovered are plain ware of a character which can be duplicated from the Los Muertos Collections. Although the indication is not positive, they probably date from Classic times. I think it can be safely concluded in the lack of contrary evidence that most of the sacred materials from caves in the Gila Basin were deposited on the shrines prior to the coming of the Spaniards. If this is the case, the question of authorship, i.e., whether Hohokam or Pueblo, must also be considered. This, too, has obstacles for both the historic Pima and Pueblo folk maintain sacred spots and the types of objects deposited do not always offer marked contrasts. The cane cigarettes with cotton sashes are pretty closely confined to caves of the Gila Basin and may therefore be Hohokam, while cane cigarettes without this feature are widely used among the Pueblos. The effigy pahos of Double Butte Cave manifest a strong Pueblo character and no analogies with recent Pima articles. It seems probable that much of the Double Butte material can be attributed to the Pueblos during their occupation of this area in late prehistoric times.

POTTERY

The sherds include several fragments of a scoop analogous in form to those found in Los Muertos. Although the color of the ware is brown instead of the characteristic red, the change was probably brought about by the fire that destroyed much of the cave material.

There is, in addition, a large plain sherd from a mended jar in which a thong of hide — used in binding pieces together — is still to be seen, and also a portion of a second jar smeared with pitch. Into this substance, according to the record and to the traces still visible, other sherds had been set, sealing the mouth of the container.

¹ Bell Butte on the U. S. G. S. Mesa Quadrangle Sheet.

CANE CIGARETTES

The most abundant article found in the sacrificial caves of the Gila-Salt region are the so-called ceremonial cigarettes. These consist typically of a short section of cane stem taken at the node, one end being stuffed with "tobacco," while around the exterior is fastened a small cotton sash. Several hundred of these were found in Double Butte Cave.

The plant from which the tubing for the cigarettes was obtained is *Phragmites communis*. This formerly grew along the marshy spots of the Gila and Salt rivers, but the recent control of the water in these rivers has been responsible for the almost complete disappearance of the plant. The stem is made up of a series of sealed chambers, each separated from the other by a septum at the node (pl. 87, *a*). Cylinders were cut from the stem at the nodes varying in length from $\frac{3}{4}$ to 3 inches (pl. 87, *b*, *c*) and averaging about $\frac{1}{2}$ inch in diameter. The severing of the tube was usually so arranged that the node fell nearer an end, thus leaving a shorter and a longer chamber, henceforth designated as the butt and the tip. The latter is always on the upper side of the node if the tube is oriented in the natural growing position of the stem. The tip was then filled with "tobacco" (pl. 87, *d*) and to prevent it from shaking out the edge of the tube was crimped by making a series of short cuts with a sharp tool. In order to make the cigarette usable, the septum or wall dividing the butt and tip portions of the tube had to be pierced. In this, however, there is no uniformity, as less than twenty-five per cent of the prepared cylinders have been so treated, the others being useless for actual smoking. This is not surprising, for not a single one of those collected from Double Butte gives evidence of actual use.²

² This contradicts Fewkes' statement (1912, p. 135) that the cane cigarettes invariably show burnt ends. Cigarettes found by Hough in the Bear Creek Cave were rarely burnt, thus paralleling the condition noted for the Double Butte Cave examples (Hough, 1914, p. 107).

³ Identified by Dr. H. W. Youngken, Massachusetts College of Pharmacy. Although the leaf ingredient was highly pulverized and oxidized, Dr. Youngken feels quite sure that the material is *Nicotiana tabacum*. Fewkes reports (1912, p. 143) the finding of a clay

This fact alone lays some stress on the purely sacrificial and symbolical character of the objects, as smoking was not an essential act.

The contents of the tubes is usually spoken of as tobacco but an examination of the material in the Double Butte Cave cigarettes shows this to be only partly true. Although tobacco³ was found to be present in several instances, it was by no means universal and in every case where it was present it formed only a very small per cent of the total content. The chief substance proved to be of a woody nature highly charged with pitch. Occasional large pieces of this material show it to have been from the outer and resinous covering of shrub or tree. It may be from *ocotilla* which has a scaly aromatic bark. The cigarettes from Bear Creek Cave located near the Arizona-New Mexico boundary were similarly filled with "aromatic herbs."⁴ The burning of this substance has a somewhat pungent, though not unpleasant odor, and one gets the impression that the material was selected for its incense value. The ritual use of copal incense in the whole of the Middle American area was and still is a very important factor. The northernmost use of copal is doubtless among the Tarahumare, a Piman tribe, where it is extensively employed in the rites of the Hikuli Cult.⁵ Thus, the use of the aromatic substance in the cigarettes — copal was not available here — may represent a northern extension of the incense-sacrifice idea.

The description of the ceremonial cigarettes has not yet made clear the nature of the outer wrappings. These accessories are of two types: (a) a simple wrapping of cotton cord, with or without further features, and (b) a woven sash, tied around the mid-portion, sometimes over a preliminary wrapping. In the collection of

vessel in Casa Grande containing *Nicotiana attenuata*, and Russell records (1908, p. 119, footnote) that the Pima use three varieties of tobacco. According to Setchell (1921, p. 410), *Nicotiana attenuata* is native to the Southwest, but *Nicotiana tabacum* — the best and most widely known variety — is believed to have originated in tropical regions and thence spread widely, although it was almost unknown in aboriginal times north of Mexico (1921, pp. 400-401).

⁴ Hough, 1914, p. 107.

⁵ Lumholtz, 1902, pp. 362, 367, 376-377.

cigarettes from the Double Butte Cave, the latter are numerically somewhat more abundant than the former.

In the first type, the prevalent form consists of a tube with a single string wrapping just above the node (pl. 87, *e, f*). The loose end is fastened by slipping it under a turn of the string. In three tubes, the string consists of twisted brown and white cords (pl. 87, *g*). A few examples show a fringe, also of cotton projecting from below the binding (pl. 87, *b*) and occasionally the fringe is of apocynum cord (*i*); cigarette *j* has a double apocynum fringe, showing on opposite sides; and *k* has a large "bow" of cotton string.

The most conspicuous part of the cigarettes of the second type is the sash (pl. 89, *a*; see also pl. 90, *c-h*), consisting of an individually woven piece of fabric averaging about $\frac{3}{4}$ inch wide and 2 inches long. Plate 88, *a* illustrates a tube wrapped only with this sash. In most cases, however, there was first attached to the tube a small fringe of cotton or apocynum cord. If this had no binding string fixed to it (pl. 89, *c*) a separate string was used (pl. 89, *b*), whereas, in most cases, these were combined (pl. 89, *d*). If the fringe was of apocynum, a cotton string was frequently used in conjunction with it (pl. 89, *e, f*), there probably being some symbolical significance in the combination. This fringe, having four or more pendant cords, usually shows below the sash towards the butt end of the tube (pl. 88, *c*). In *d* (pl. 88) the sash is dyed blue; *e* and *f* show apocynum fringes, the first single, the latter double. The sashes were normally tied into position with the free ends of the basic yarns forming the framework on which the fabric was woven, or, a special cord might be passed around the sash to hold it in place. More details as to sashes will be found under the discussion of textiles from the cave. As to further accessories, beads were sometimes tied to the cigarettes. None of those at hand, however, preserve this feature, although several cases of the kind are mentioned in the field record. A small piece of knotted cotton string holding two turquoise beads (pl. 89, *g*) was probably formerly attached to a cigarette.

In five instances the cigarettes were tied together in quartettes. The number four is doubtless to be interpreted as being a magical number, relating to the cardinal points. Four of the composite offerings are illustrated in plate 88, *g-j*. The first group is heavily wrapped with a loosely twisted 4-ply string, each individual cigarette having been previously bound, and the second group is of the same order. The third set is made up of cigarettes individually wrapped with sashes but having no under-bindings, the four being fastened together with strings at the margins of the sashes, both around and between the cylinders in both directions. The last group shows the individuals with fringes of apocynum. This compounding of cigarettes also occurs to the east in Bear Creek Cave.⁶

While there is a suggestion that cane cigarettes were sometimes inserted into holes in the stub pahos, and although Hough found cigarettes tied to pahos⁷ in the Bear Creek Cave, it is probable that in the main the cigarette offerings were made independently of other ritualistic articles.

Any attempts to ascertain the esoteric significances of the various parts of the cigarettes are at best only surmises. Cushing held that the cigarettes were symbolical of the individual that sacrificed them and that the parts with which the tubes were equipped stood for the attire of the sacrificer.⁸ Thus the sash becomes the blanket, the under-wrapping—here referred to as the fringe—becomes the string skirt. Furthermore, he asserted that both male and female forms were represented. Hough has pointed out that the censers of Mexico and Central America often are endowed with human attributes.⁹ In addition to those showing obvious human characteristics, an incense burner of hour-glass form of clay is pointed out which is supplied with a modelled sash or belt about the middle. Although the analogy may have but little force, it is nevertheless worth noting. If Cushing's interpretation is right, the reason for the excessive use of apocynum fiber for the fringe or "skirt" is somewhat illuminated by the fact that skirts of this ma-

⁶ Hough, 1914, p. 108.

⁷ Hough, 1912, p. 129.

⁸ Cushing's unpublished report. Perhaps the same

idea lies behind the fastening of a fringe on the image side of a Zuñi war god bundle, Parsons, 1918, fig. 45, p. 402.

⁹ Hough, 1912, p. 129.

terial were worn by the females living somewhat higher up on the Salt River at about the time the cigarettes may have been deposited, and the blankets current at that time were of cotton with warp and weft running the directions corresponding to those of the miniature sashes.¹⁰

It is reasonably certain that the sacrifice of the incense was by implication rather than by actual burning. To some extent this same idea prevailed to the south as evidenced by the sacrificed copal, recovered from the sacred cenote at Chichen Itza, Yucatan, and by the modern practices of the Lacandonese,¹¹ but it is true, nevertheless, that a large portion of it was also burned.¹² The scarcity of pottery or stone "cloud blowers" in the Gila Basin as compared with the Pueblo area may be explained by the superabundance of the cigarettes which replaced them.

The question of authorship of the cane cigarettes in the Gila-Salt region — whether Hohokam or Pueblo — necessarily demands a word

as to distribution and comparison. Lack of adequate information prevents this analysis from being as complete as it should be to have significance. Thus far the caves of southern Arizona and New Mexico have been the chief producers of the ceremonial tubes, although reed cigarettes are said to have been used, presumably in aboriginal times as well as modern, far into Mexico.¹³ The distribution is therefore extant in both Pueblo and Hohokam territories. Current usages also appear in both territories.¹⁴ This makes it quite impossible to say which of the groups was responsible. On the basis of comparisons, nothing further is to be added to this opinion. In the New Mexico caves the cigarettes tend to run to longer lengths than in the Gila and they lack the woven sash, although they are supplied with the string around the middle and frequently with beads. But an obvious relationship certainly exists, and one is at a loss to know whether the difference is due to space, time, or group preference.

PAHOS

An almost invariable accessory to cave shrines in the Pueblo territory are objects commonly known as prayer sticks or pahos. These are variable as to form, but usually consist of painted sticks to which feathers and other sacred articles have been attached. Approximately seventy-five of these were found in the Double Butte Cave. The classification of these prayer sticks is that adopted by Hough.¹⁵

Stub Pahos: These consist of shoots or twigs, probably cottonwood and willow, which have been peeled and rubbed smooth. Lengths vary from about 7 to 30 inches; the average is 20 inches. Usually one end is pointed, doubtless to facilitate setting up about the sacred spot, while the upper end is blunt and carefully trimmed. In a few instances the sticks were sharpened at both ends. Color decoration occurs on practically every paho, as may be seen from the representative series in figure 127. Although black and red predominate,

green, blue, yellow, white, and specular iron pigments also occur. Pahos *b* and *c* (fig. 127) have been bored, the first with a single hole, the second with three, the central one being at right angles to the other two. These are about $\frac{3}{16}$ of an inch in diameter. In the middle perforation there is a fragment of cane which may well be a part of a cigarette. Many of the sticks give evidence near the blunt ends of former string wrapping used in binding feathers and other significant materials to the shafts, and in some instances it appears that something, probably feathers, was stuck into the pithy center of the sticks in the blunt ends. Some pahos are paired, both as to length and manner of painting. One further point on the stub pahos, whether significant or not, should be noted. In about one-third of the examples there are several irregular longitudinal grooves on the sharpened ends (fig. 127, *d*, *e*, *i*).

Tepic-Culiacan, South Sierra, North Sierra.

¹⁰ Haury, 1934a, pp. 63, 89.

¹¹ Tozzer, 1907, pp. 125, ff.

¹² For northern Mexico, Beals, 1932, p. 141, gives the distribution of incense as follows: Jalisco-Tepic,

¹³ Hough, 1912, p. 129.

¹⁴ Cushing, 1920, pp. 161-167; Parsons, 1929, p. 240; Russell, 1908, p. 112. ¹⁵ Hough, 1914, pp. 91, ff.

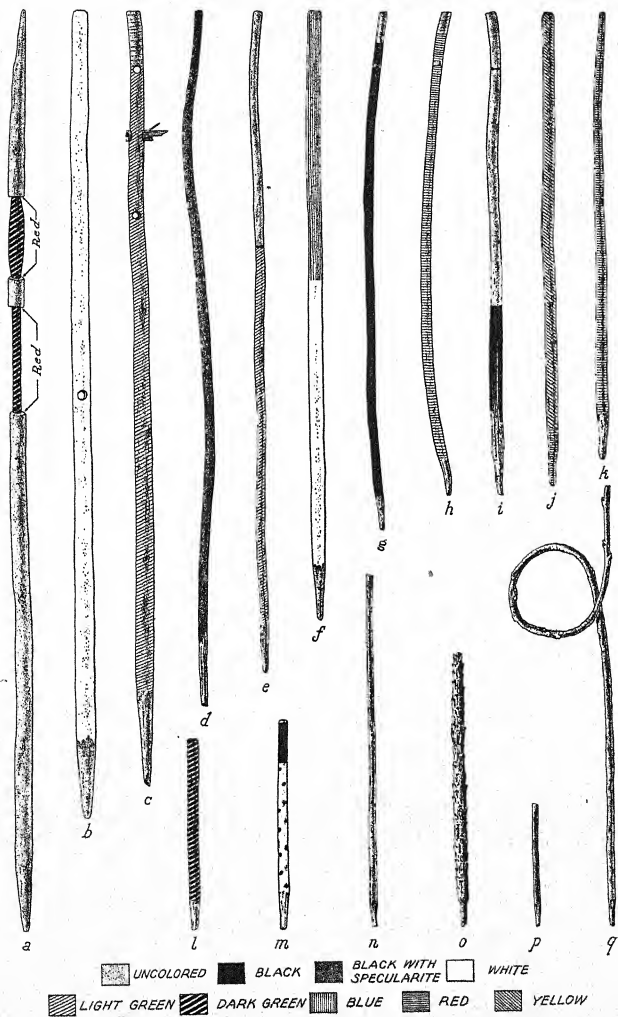


FIG. 127. Double Butte Cave. Pahos. Length of a, 34 inches.

Roundel Paho: Double Butte Cave produced only one of this type (fig. 127, *a*). Just above the middle over two short spaces the wood has been cut away giving the impression of having been turned on a lathe. These sections were painted as indicated while the remainder of the stick is uncolored. Roundel pahos are reported from the Bear Creek Cave and other caves in New Mexico.¹⁶

Twig Pahos: Small shoots and twigs were sometimes transformed into pahos by merely sharpening one end and attaching the necessary regalia. In the half dozen pahos of this sort from the Double Butte Cave the bark was not removed and their sizes are considerably under that of the stub type (fig. 127, *n-p*). Example *o* of the group just referred to is the end of an ocatilla stalk.

Crook Paho: This name was given by Hough to prayer sticks with curled ends. While figure 127, *q* is not strictly of this type, it approaches the crook type more so than any other. The loop was formed while the twig was green. Beyond the sharpening of the lower end, it shows no other features.

Effigy Pahos: Five articles — two pairs and one odd specimen — portraying human attributes have been termed "effigy pahos" as they were apparently used in the same way as the other paho types. In figure 128 the paired pahos, *a, b*, and *d, e*, are made of the very light wood of the agave flowering stalk. This was split into sections about $\frac{1}{16}$ of an inch thick and then trimmed to the desired form of about 11 inches long and $1\frac{1}{2}$ inches in width. Shallow notches near the broad end serve to offset the head from the tapering body. In the first pair (fig. 128, *a, b*) a black paint containing specularite was first applied as an all-over coating on which the other patterns, chiefly of a geometrical character, were painted in polychrome. The bodies of both were also perforated, the first with short oblique cuts, the second with small rounded holes. It is possible that further decorations, such as feathers, were inserted into these. The second pair (fig. 128, *d, e*), somewhat less skillfully worked than the preceding, first received a coating of red pigment charged with specularite. The patterns

applied on these are for the most part rather vague but the forms are clearly reptilian in contrast to the prevailing geometric style of the first pair. The horned toad, centipede, and serpent are recognizable. The reverse side of *d* has, just below the eyes and nose, a symbol suggestive of the rainbow. Body perforations are lacking on these.

The fifth effigy paho (fig. 128, *c*) is of a different character and is probably the most significant. The specimen is carved of cottonwood and measures $7\frac{3}{4}$ inches long. The basal portion has been damaged by rats. More attention was paid here to the carving, especially of the head and the vertical projection from the upper margin. Limbs, however, are not indicated. The character of the painted decoration and the colors used may be seen in the illustration. Both body and head are black on the reverse side.

The similarity of this object to Hopi kachinas — the personifications of ancestral spirits — needs hardly to be pointed out. I am not aware that kachinas have ever been found in archaeological deposits but one can recognize in this specimen the prototype of those currently used. On the basis of the extent of carving, modern forms are of two types: those carved in the full round with well-represented arms and legs, and those of tabular form on which the limbs are rudimentary or absent. It is said that the latter type figure chiefly in the kiva ceremonies while the former are the customary type offered for sale to the tourist. Apart from the physical likeness of the Double Butte example (*c*) to the tabular modern form, the conservatism displayed in their use in the ritual preference of the simpler type would tend to indicate this form to be the older. A further comparison of the symbolism and form of decoration of the latter with modern Hopi kachinas shows a substantial identity of elements with the *Sio Humis* kachina.¹⁷ The outstanding similarities are: the division of the face into blue (left) and red (right) halves, the diagonal body stripe, and the black-painted body. The headdress of the modern kachina is considerably different than the simple projection on the old example but this difference may be accredited to recent modifications. The

¹⁶ Hough, 1914, pp. 96-97; Cosgrove, 1945.

¹⁷ Fewkes, 1903, p. 64, pl. V.

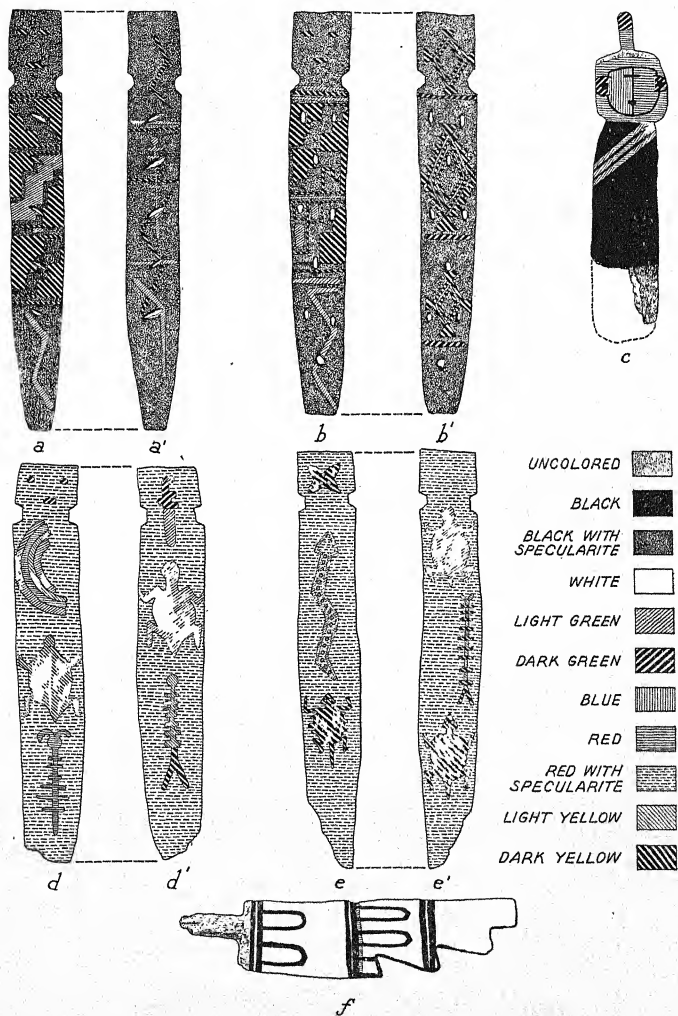


FIG. 128. Double Butte Cave. Effigy pahos. Length of a, 10 1/4 inches.

persistence of symbolism over many centuries, however, may be indicated.

The Sio Humis kachina is said to have been recently introduced to the Hopi from Zuñi.¹⁸ This in no way alters the probability of the connection implied by the above comparison; but it increases its validity for the following reason: the former Pueblo occupants of the Gila—the Saladoans—on retreating from that area in the 13th or 14th century may have withdrawn to Zuñi and through the mingling that followed, have lost their identity. Opportunity was thus afforded for the transmission of this specific kachina from the Gila-Salt area, where the Double Butte specimen was found, to Zuñi.¹⁹

While it must be pointed out again that the date of the Double Butte material is not secure, it is upon the strength of the analogy of this proto-kachina and the various forms of pahos with material known to be Pueblo that a Pueblo origin can be claimed for it. Since the Gila Basin has neither been occupied by Pueblo peoples within historic times nor before the Classic Period, there is then but one other ready explanation, namely, that this material dates from the Los Muertos-Casa Grande period of occupation in the thirteenth and fourteenth centuries.

One other point needs mention. The face treatment of the Double Butte effigy is unquestionably intended to represent a mask, a feature with which all kachina dolls are supplied as well as the living impersonators of the supernatural beings at festival times. There appears to be no sure evidence that the mask, as an ele-

ment of ritual regalia, dates from before the period of European contacts. Parsons has expressed the opinion that if the mask was pre-Spanish, its use was then chiefly confined to the western part of the Pueblo territory (i.e., Hopi and Zuñi).²⁰ The present example may be taken as fairly certain evidence of the existence of both masks and kachinas prior to 1540, and the appearance of the Double Butte specimen in the Gila supports the view for a western priority.²¹

Figure 128, *f* is apparently the wing of a composite wooden bird. This is suggested by the tenon at the base used either for insertion into the mortise in the body of the bird or for attachment otherwise, by the trimming out of the lower marginal end of the wing in imitation of feathers and by the painting of feather symbols in black on the white surfaces of the wing. Its shape is analogous to that of bird wings frequently depicted on Mimbres pottery. The total length of the article is 8¾ inches and the thickness is about ¼ of an inch. The reverse side is also painted, red, green, black, and white being in evidence, but the surface is so heavily encrusted with rat and bat droppings that the pattern cannot be determined.

Composite birds of wood have been reported by Hough²² and Cosgrove²³ from New Mexico but in no instance were the wings treated precisely as the specimen just described. Single piece birds, carved in the full round are also known from New Mexico and from northern Arizona and southern Utah.²⁴ Survivals of the same are seen in some present Pueblo rituals.

ARROWS AND FORESHAFTS

Remnants of arrows and foreshafts in the sacrificial cave of Double Butte are not very abundant but they are a manifestation of a

widespread practice of depositing arrows at sacred spots which has survived from aboriginal to modern times. Caves of Arizona and

¹⁸ Fewkes, 1903, p. 64.

¹⁹ Owing to the rapid changes in kachinas and the introduction of new ones, the writer is fully aware of the danger in attempting to link the Double Butte kachina with a specific one in use today. Yet the similarity is so striking in several features that it seems more than a coincidence.

²⁰ Parsons, 1930, p. 594.

²¹ Parsons describes (1933, p. 612, footnote 3a) the Double Butte example in the following terms: "A ritual stick, perhaps a prayer-stick, perhaps a kachina

'doll' or 'baby,' has painted on it an indubitable kachina mask, parti-colored, with the characteristic kachina doll ears. A bandolier is painted on the nude body. The stick suggests the encradled 'baby' used by the Keres and associated with cave shrines (Noel Dumarrest, Notes on Cochiti, New Mexico, AAA VI, no. 3: 141-142, fig. 3, 1920)."

²² Hough, 1914, pp. 104-105.

²³ Cosgrove, 1945.

²⁴ Hough, 1914, p. 103; Cummings, 1915, p. 280; Kidder and Guernsey, 1919, p. 145.

New Mexico, for example, have yielded many fine arrows, both of normal size and miniature,²⁵ while among the Huichol of northern Mexico, the custom is carried to the extreme.²⁶ Russell found arrow shafts on a Pima shrine located in the saddle between Double Butte only a short distance from the Double Butte Cave.²⁷

The arrow remnants from the Double Butte Cave are all but one of the foreshafted type. None of the hard wood foreshafts are complete. These were let into the cane shafts for a distance of about 2 inches, the ends having been tapered as will be seen in figure 129, *a-c*. Sinew bindings about the end of the cane shafts prevented splitting and held the foreshafts in position. Figure 129, *d* shows the notch in the end of an arrow made of arrowbush into which the stone point was set. Although this might be confused with the nock for engaging the string of the bow, the impressions of the shoulders are to be seen on either side just below the notch. Information as to length of shafts and feathering is lacking.

These obvious arrow types again raise the question as to whether or not two culture groups are involved. Suffice it to say that the unforeshafted arrow of arrowbush is a modern Pima trait,²⁸ while cane shafts fitted with

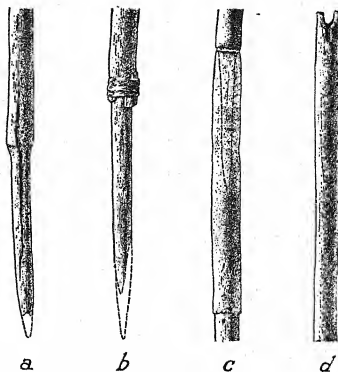


FIG. 129. Double Butte Cave. Arrow foreshaft fragments (*a, b*), foreshaft fitted into cane shaft (*c*), fore end of arrowbush arrow showing notch for stone point (*d*). Diameter of *b*, $\frac{1}{8}$ inch.

wooden foreshafts appear as the typical weapon of the Pueblo Indian who lived somewhat higher on Salt River during the 1300's.²⁹

COPPER

McClintock³⁰ writes that in the Double Butte Cave, Cushing found a "fragment of copper, roughly fashioned as a cutting instrument."

Neither the specimen itself, nor mention of the same is preserved in the meager records of the Expedition.

GOURD

A small gourd bottle, $2\frac{3}{4}$ inches in diameter, made from the fruit of the common dipper

gourd (*Lagenaria*) was found among the other objects in the cave.

CORDAGE AND TEXTILES

Most of the free bits of cordage in the cave are cotton (pl. 90, *a*). The bulk of these are single strand twists, but a few 2-, 4-, and 6-stranded cords occur. Plate 90, *b* shows white yarn wrapped around a small stick. Red, yellow, blue, and black dyed cords are also pres-

ent, as are strings of the bast fiber apocynum and a few short fragments of yucca fiber cords.

Except for two small fragments of plain cloth all of the woven material consists of the sashes ordinarily fastened to the cigarettes. The chief interest of these lies in the fact that they were

²⁵ Lumholtz, 1912, p. 42; Hough, 1914, pp. 63-66; Cosgrove, 1945.

²⁶ Lumholtz, 1902, pp. 171, 203-204.

²⁷ Russell, 1908, p. 255.

²⁸ Russell, 1908, p. 96.

²⁹ Hauri, 1934a, pp. 106-108.

³⁰ McClintock, 1916, p. 5.

individually woven in a manner which merits notation. The process seems to have been somewhat as follows: On a frame, or to two rigid side pieces, there were fastened two pairs of strings from $\frac{1}{2}$ to $\frac{3}{4}$ inch apart and about eight inches long. Although these strings were double, they were not twisted into a single yarn (fig. 130, *a*). Next to one of these strings, destined to form the end selvage of the fabric, there was tied another yarn (fig. 130, *b*) for stretching the warp web. This yarn was carried across to the other basic yarn around which it made a complete turn before returning to the starting yarn. The process was then repeated until the warp was stretched to the desired width, this usually being about 2 inches. It will be noted that the warp runs the short dimension of the fabric. When a sufficient width of warp had been stretched, the same

yarn was doubled back and woven into the warp, now as the weftage (fig. 130, *c*) and carried on through until the fabric was finished (fig. 130, *d*). Thus miniature sashes were made of a single yarn, excepting the 2-paired foundation cords. As the final step, the free ends of the latter were twisted (fig. 130, *e*). Typical examples of sashes will be seen in plate 90, *c-g*.

A lone sash from the Double Butte Cave was woven in a fancy twill (pl. 90, *b*). It is somewhat larger than the average for the others, being $\frac{3}{4}$ by $2\frac{1}{2}$ inches. The foundation of this sash was prepared of white cotton yarn as in the case of the others but the weftage consists of blue dyed yarn somewhat larger in diameter than the warp strands. This was woven into the warp in an over-two-and-under-two rhythm chevron pattern.

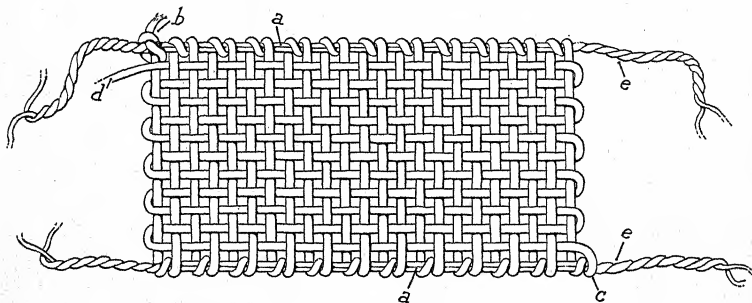


FIG. 130. Diagrammatic drawing of "sash" found on cane cigarettes.

CAVE IN SUPERSTITION MOUNTAINS

The Superstition Mountains are situated some 30 miles east of Los Muertos. The location of the cave from which the two objects mentioned below were taken is not known. The first of these is a bundle of prepared basket splints, probably of willow, such as are used in the manufacture of coiled basketry. The second article is a club of mesquite wood of the so-called "potato-masher" type (fig. 131) said to have been used with a punching blow.

Its length over-all is 17 inches and the greatest breadth of the head is 3 inches. About the perimeter of the cylindrical head there are shallow nicks, possibly decorative, and a notch has been cut near the end of the handle. The entire club is painted red; it weighs 21 ounces. Tool marks on the various parts of the cudgel appear to be those of a steel knife, thus suggesting its manufacture in a comparatively recent period.

Clubs of this type are reported to be typical of the tribes of the lower Colorado River³¹ and they are said to have been practically as important as the bow as defensive weapons

among the Pima.³² Since the cave in which this club was found lies within the former range of the Pima, with little doubt it may be ascribed to them. Its date is certainly post-Spanish.

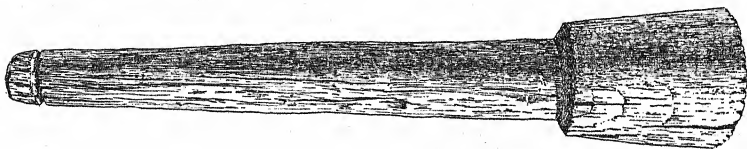


FIG. 131. Mesquite club from cave in Superstition Mountains. Length, 17 inches.

³¹ Spier, 1928, p. 256.

³² Russell, 1908, p. 96.

CONCLUSIONS

UP TO this point we have been concerned primarily with the description of the cultural material collected by the Hemenway Expedition in the Salt River Valley ruins. Wherever possible, questions concerning the origin of traits, their history, and their position relative to the two ethnic groups involved in this study have been touched upon so as to eliminate these angles from this final section. Some of the broader aspects of the Classic Period and of the Hohokam-Pueblo relationship should now be considered.

By far the largest part of the Hemenway Collection is made up of specimens from Los Muertos and the contemporary village, Las Acequias, both occupied chiefly during the Classic Period. These towns were among the largest existing during that period in the Salt River Valley and they may be regarded as being fairly representative. The class of specimens from the other ruins excavated by Cushing, earlier for the most part, has been well illustrated and convincingly placed chronologically through stratigraphy by Gila Pueblo's work at Snaketown. Fortunately the Los Muertos Collection can now be added to the Snaketown sequence, chiefly characterizing the Civano Phase of the Classic Period, in a way impossible heretofore because of the scarcity and poor documentation of specimens. The weakness of the sequence still lies in the little-understood Santan Phase of the Sedentary Period and in the introductory phase (Soho) of the Classic Period.

Gladwin¹ has ably summarized the Classic Period and recent researches have not shown the need for any major revisions. It is clear that greater changes in the development of the Hohokam Culture took place between the Sedentary and Classic Periods than between any other two periods — changes which appear to have been brought about largely through out-

side forces rather than because of any internal troubles. Viewed temporally, the beginning of this deflection in Hohokam growth seems to have been at the end of the Sedentary Period, probably about 1150 to 1200 A.D., and it was continued up to about the end of the fourteenth century.

The first evidence of this is seen in a rather marked rearrangement of villages at the end of the Sedentary Period. As the result of an extensive stratigraphic and areal survey of the Salt River Valley, Schroeder² has been able to point out that Sacaton Phase sites in the valley are widespread, while those dating from the Classic Period occupy a more restricted area, being concentrated somewhat nearer the river. He recognizes also that trash of the Soho Phase occupation never rests directly on the trash of the Sacaton or Santan Phases of the Sedentary Period. Between all other phases it is possible to find trash in conformable relationship. It seems as though established villages were abandoned in favor of new locations at the beginning of the Classic Period. What this apparently means is that a disruptive influence was present in the area, causing a rather widespread adjustment of the population. I cannot agree with Schroeder, however, in his belief that the area was depopulated at this time. The time between the projected abandonment and return seems altogether too short and the persistence of many traits of material culture may be cited as arguments against it.

I am not prepared to discuss the possible reasons for these changes. Certainly nothing in the Hemenway Collection sheds any light on the problem and its solution had best be left to those who are currently working in Gila-Salt archaeology. It can be stated, however, that the main impact of the Salado influence and migration was not felt until about a century later.

¹ Gladwin, Haury, Sayles, and Gladwin, 1937, pp. 264-267; Gladwin, 1937, pp. 103-105.

² Schroeder, 1940, pp. 147, 153-154.

The losses and gains of the Classic Period as opposed to the Sedentary Period may be highlighted as follows:

LOSSES:

- Ball courts: Probably persisted into the early part of the period, but appear to have been extinct before the end.
- Pottery: The shouldered and evert-rimmed jar; the flare-rimmed bowl, in fact the painted bowl as such; legged vessels; thick-walled vessels; life forms in decoration; figurines rare to absent.
- Stone: Slate palette degenerate and rare; little carved stone; shouldered axe; mosaic pyrite plaques.
- Shell: Reduction in number of species; etched shell.

GAINS:

- Agriculture: Maximum development of canal systems.
- Architecture: Consolidation from *rancheria* to more compact villages; large heavy-walled rubbish-filled mounds present with structures on top (Soho).
- Disposal of dead: Extensive inhumation (Civano), owing to Salado penetration.
- Pottery: Vertical-necked painted jars with geometric "woven" style patterns; dominance of polished red ware and greatly intensified use of smudging technique; Gila and Tonto Polychrome; specialized spindle whorls; griddles.
- Stone: Adze and double-bitted axe; arrow straightener; hoes; stirrup crushers.
- Shell: Output of shell products increased.

The finer distinctions of the material culture within the Classic Period, i.e., the determination of the components of the Soho and Civano Phases, will need to be further amplified by new excavations — excavations of a kind which few archaeologists have been willing to make. This would entail the complete, or nearly complete, destruction of the architecturally complicated Soho Phase mounds, peeling the occupation levels off in reverse order of their

construction; and further detailed studies of architecture and trash of Civano Phase sites in the light of current problems. Efforts along these lines have recently been made by the Pueblo Grande Laboratory of Phoenix, and it is to be hoped that their findings will soon become available.

The main event of the Classic Period was the arrival of new people — a people ethnically separable from the Hohokam. This was the Salado migration, introducing a host of new problems into the archaeology of the Gila-Salt area. What can be said, for example, of their genesis; what happened to cultural boundaries; what was the time and what were the causes of the movement; can the attitude of the Hohokam towards the Salado be ascertained; are the effects of the impact of the two groups definable; and, finally, when and why did the Salado withdraw? Beyond the recognition that there was a movement of Pueblo people into the desert country, we still are not in position to discuss the problem in extensive detail. But some speculating can be done.

To most people the Salado Culture has meant a southern increment of Pueblo people who lived in stone villages with encircling walls known as compounds, who buried their dead, and who made pottery known as Pinto, Gila, and Tonto Polychrome. The time of this development is put at roughly from 1200 to 1400 A.D. and the place somewhere north of Globe, Arizona. Actually, of course, the Salado must be accredited with a much longer history than this. Gladwin³ has already suggested that the roots of the culture must be sought much earlier and recent work by the University of Arizona in the Forestdale Valley, northern Fort Apache Reservation, is indicating both where the early Salado development seems to have taken place and what some of the ingredients were.

It appears that the culture emerged from a combined Mogollon-Anasazi base — stamped most heavily by the latter — in the area below the Mogollon Rim. With each advancing stage it achieved greater individuality and the center of gravity was shifting gradually south and west. This became intensified in late prehistoric times when the Salado over-ran the Hohokam.

³ Gladwin, W. and H. S., 1934, chart opposite p. 22.

kam territory. By the thirteenth century Salado villages were numerous and large in the Roosevelt Lake-Globe area and they represent in "purity" the culture which later spread westward and southward. In spite of the impor-

that the two are believed to overlap, but not necessarily to be of the same duration. Only the southern frontier of the Pueblo people and the northern boundary of the Hohokam Culture will be used, as it was only on these sides

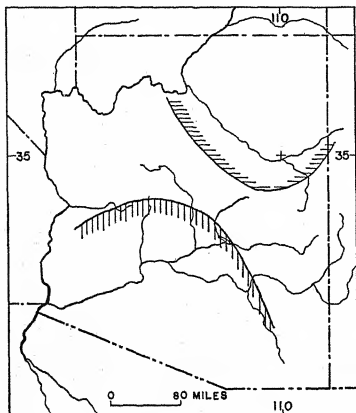


FIG. 132. The southern frontier of the Pueblo and the northern frontier of the Hohokam during Colonial-Pueblo I times.

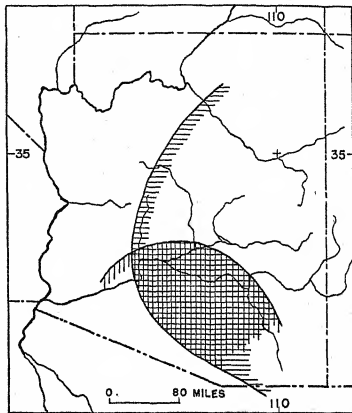


FIG. 133. The southern and western limits of the Pueblo expansion and the northern boundary of the Hohokam during Classic-Pueblo IV times. Only then did the areas of the two stocks actually overlap.

tance which has been attached to this group, the archaeological literature of the Southwest still lacks a full and comprehensive analysis of a Salado site of the thirteenth and fourteenth centuries.⁴ The appearance of such a report would materially aid in the study of the Salado in the Gila-Salt area.

This puts us in a position to examine in part the geographic bounds of the two groups. Two periods have been selected as showing the conditions most graphically: Colonial-Pueblo I and Classic-Pueblo IV. This pairing of periods implies contemporaneity only to the extent

that the two groups were exposed to each other.⁵

During the Colonial-Pueblo I Period (fig. 132) the Pueblo boundary is shown as extending from the south rim of the Grand Canyon through Flagstaff, whence the line roughly follows the Mogollon Rim into eastern Arizona where it bends sharply northeastward. The Hohokam frontier extends from Bouse in western Arizona to Congress Junction, thence in a southeasterly direction including the lower Verde, and the lower part of the Tonto Basin; from this point the line bends to the south to

⁴Schmidt's reports (1926, 1928), based on work in the Roosevelt Lake area and at Togetzogi west of Miami, are about all we have. The thorough excavation of Besh-ba-gowah—a Salado site near Globe—has been completed under the direction of Mrs. Irene Vickrey (1937), and her final report [1939], together

with Gila Pueblo's work in Salado sites, is awaited.

⁵The boundaries as shown are based on knowledge now available and, while they may be shifted locally as further evidence comes to light, it is extremely doubtful if any early overlapping can ever be proved.

CONCLUSIONS

207

	HOHOKAM	SALADO
Head form:	?	Brachycephalic, deformed.
Burial custom:	Cremation, urn burial.	Inhumation, extended, often below house floors.
Agriculture:	Extensive, controlled irrigation.	Intensive, flood-water irrigation, changing to canal irrigation on arrival in Gila-Salt area.
Domesticated animals:	Dog.	Dog, turkey.
Architecture:	Earthen walls with massive retaining walls, topped with flimsy structures; also unit-type shallowly excavated houses in open. Adobe compound walls (borrowed).	Multi-storied great houses and compact groupings of single-storied, adobe-walled (Gila Basin) and stone-walled (Globe-Roosevelt area) houses. Stone compound walls.
Pottery:	Paddle-and-anvil technique of finishing; red-on-buff; polished and smudged red ware; gray to brown plain ware.	Coil-scraps technique; polychrome in black, red, and white; corrugated; slipped corrugated red ware; smudging; brown plain ware.
Other clay objects:	Griddles; human figurines (rare), animal figurines; Mexican-type spindle whorls.	Animal figurines (rare), disc-type spindle whorls.
Stone:	Rectangular, full-troughed metates, well-shaped; mortar and pestle; hoes; three-quarter grooved axe; carved stone vessels and slate palettes (rare); stirrup crushers; rings and "medicine" stones; chisels; large-type arrow straightener.	Full-troughed metates not carefully shaped; three-quarter grooved axes, double-bitted axes, adzes; polishing stones; small-type arrow straighteners.
Shell:	Many species used; high skill in carving, some inlay and overlay.	Few species used; carving not specialized; turquoise overlay prevalent.
Perishable materials:	Wooden paddle-shaped tools, coarse twilled mats.	Painted coiled basketry, cane cigarettes, pahos, proto-kachina.

include the San Pedro Valley. The important feature shown by this comparison is that the boundaries do not meet. They are separated by a strip considerably less than 100 miles in width in which these cultures were not rooted, but over which trade relations were maintained. It is probably not accidental that this vacant strip corresponds, in the main, to a northwest-southeast trending mountainous belt separating the low-lying Hohokam habitat from the higher plateau land occupied by the Pueblo. This environmental correlation is one of the main differences between the early Pueblo and Hohokam, although as will presently be shown, the Pueblo over-ran a part of the lowland province at a later time. Los Guanacos, the Grewe site, Roosevelt:9:6, and Snaketown represent the Hohokam during this stage.

During the Classic-Pueblo IV synchronism (fig. 133) a marked change took place.

* Kroeber, 1928.

The Hohokam frontier probably experienced a slight shrinkage over the preceding stage, chiefly on the northwestern side, but the change was a minor one. For the Pueblo stock, the line has been completely shifted. It has not only passed completely over the former vacant strip but has advanced deeply into Hohokam territory, reaching approximately Gila Bend on the west and trending in a southeasterly direction through southern Arizona and into northern Mexico. It is noteworthy that the Hohokam border yielded but imperceptibly to this influx and, for this reason, there was a superposition of one culture upon the other. This was the period of Los Muertos, Las Acequias, and Casa Grande, the period of high architectural attainment, the time of Kroeber's "transient contact."⁸

Another point to be drawn from this boundary comparison is the fact that, from Colonial Period times on, the northern limit of the

Hohokam was non-expansive, as opposed to the more mobile and fluctuating southern frontier of the Pueblo Culture. Environmental ties, dictated by extensive agriculture through canal irrigation, may, in a large measure, have helped to keep the Hohokam stationary. The Pueblos, also dependent upon an agricultural livelihood, raised their crops mainly by a process of flood-water irrigation⁷ and they were thus freer to move about.

Their many briefly occupied ruins tend to show that this was the case.

With the geographical aspects out of the way, it will be well to review in tabular form some of the more outstanding tangible differences in culture. The comparison above is based on the Hohokam and Salado during the contact period, and some traits of the latter are selected from unmixed sites farther east.

While the time of the Salado expansion into the Gila-Salt area cannot be precisely established, archaeologically speaking, it can be reconstructed with a relatively small margin of error. Through tree-ring studies we know approximately when Pinto Polychrome ceased being made in favor of Gila Polychrome. This change appears to have taken place between the final years of the 13th century and the early decades of the 14th century. Since Gila and the derived Tonto form of polychromes only are present in quantity in the Gila-Salt area, the arrival of the Salado must post-date this transition in ceramic style. Broadly speaking, the migration may be regarded as having taken place at about 1300 A.D.

If we now inspect the Southwest as a whole at this time, it appears that the Salado westward movement was but one event of several which affected the area. It coincided more or less with the shrinkage of the northern frontier of the Pueblo people, when the cliff dwellings of the Mesa Verde, southern Utah, and northeastern Arizona were abandoned. The occupants of these regions began what seems to have been a shift to the south. The Kayenta region was left for the present Hopi territory⁸ and from the Four Corners (San Juan) the people moved

south, leaving traces at such places as Aztec⁹ and being largely responsible for the founding of communities in the Pecos drainage.¹⁰

People in the Little Colorado drainage, feeling this pressure, also pressed south, dropping over the Mogollon Rim into rugged territory to construct huge villages in the open and to seek refuge in cliff recesses difficult of access. As a part of this general expansion, the Salado people, obviously related to those of the Little Colorado, gave way and moved into the Gila Basin to share that area with the Hohokam, and even still farther south as far as the international line. They formed the leading edge of a wave of Pueblo people which was sweeping south and the expansion would appear, therefore, not to have been entirely voluntary.

This unbalancing of populations may have been primarily the result of an environmental factor, the drought recorded in the tree-ring calendar from 1276 to 1299.¹¹ Other forces, as the threat of a hostile people, or perhaps the quest for new territory, may also need to be considered; but a cause-effect relationship does appear to exist between the drought and subsequent events.

It cannot be positively asserted whether the arrival of the Saladoans was in the nature of a peaceful penetration or one of military aggression, as there is little in the archaeological evidence to suggest a condition of dominator and dominated during the dual occupation. Had the invasion been of a hostile nature, it is almost certain the Hohokam boundary would have undergone more radical change and that evidence of violence would be present. The Hohokam may have quietly accepted the invading group just as the Pima and Papago did a few centuries ago at the appearance of the first Europeans, even though this meant the sharing of their domain with the newcomers.

But the attitude of the Hohokam towards the Saladoans need not have been the same in all parts of the affected area. In the Gila Basin the merger seems to have been on a friendly basis. This is also true for the Tucson area as seen in the University Indian Ruin.¹² Piecing

⁷ Bryan, 1929.

⁸ Brew, 1945. Hargrave (1935, pp. 52-53) places the abandonment of the Segi at the end of the thirteenth century.

⁹ Morris, 1919, p. 104, *et seq.*

¹⁰ Kidder and Amsden, 1931, p. 71.

¹¹ Douglass, 1935, p. 49; see also Haury, 1934b.

¹² Hayden (in preparation).

together the conditions encountered by the Hemenway party at Los Muertos, it must be said that there, too, the two groups co-existed amicably. Possible evidence that local antagonistic attitudes were maintained comes from the Phoenix region. Here, during the Civano Phase, the occupation was dominantly Salado with only a very meager representation of Hohokam traits in evidence.¹³ Furthermore, it is becoming ever clearer that the Salado met with stone-wall resistance in the Papagueria where they never got so much as a foothold.¹⁴

Where friendly, the contact was, from all indications, an intimate one. The Salado established themselves in existing Hohokam villages, adding their own style of massive-walled structures. Refuse was thrown out on the same dumps and there must have been a co-operative use of irrigating canals and lands. In short, there was abundant opportunity for each group to observe the technical processes and the habits of the other. Yet the effect of this contact was not the emergence of a single blended culture. Where a friendly relationship was established one would expect at least some tangible clues of hybridization. Perhaps the length of the contact was too short to produce any lasting effects; or, owing to conservatism, neither group saw anything in the culture of the other to adopt.

Schroeder¹⁵ believes that there is evidence at Pueblo Grande to show that the Hohokam were driven out, leaving the Saladoans in sole possession of the region. But there are certain difficulties in the way of accepting this as applicable to all of the Salado-occupied territory.

Assuming that the Hohokam did abandon the region, the presence of the red-on-buff in the same rubbish, although in diminished amounts, with the polychrome would have to be explained on the basis of acquisition through trade with the dispossessed Hohokam. Trade between the two groups would be plausible under such estranged conditions, but the amount of pottery thus obtained seems incredibly large. Admitting that the Hohokam were forced out and that their pottery there-

after flooded the region they had just evacuated, there should be some evidence of their new home where they continued to make pottery of the type produced before changing habitat. As yet, late Classic wares of the type involved have not been discovered beyond the limits reached by polychrome to give proof of such a condition.

In Los Muertos, cremation plots were found in connection with nearly every house unit, and burials occurred within most of them. Unless it is assumed that the cremations in every case date from before the arrival of the Saladoans, and that when they did come they took possession, in every case, of Hohokam houses, using the same trash pile started by the Hohokam, this situation cannot be explained. It is more logical to read the evidence as indicative of the fact that the Salado people came in, settled with the Hohokam, built their cellular adobe-walled houses, buried within them, and that at the same time, the Hohokam maintained their individual houses or possibly also adopted the Pueblo rooms to a degree that they continued to cremate their dead and to dispose of the ashes near the trash pile used by both groups. There are a few instances on record of the finding of polychrome vessels in cremations, and the appearance of red-on-buff vessels in burials. Slight as this evidence may be, it further suggests that both burial customs were being practised in the same place simultaneously.

The tremendous investment the Hohokam had in their canal systems made for permanent land tenure. To move from the Gila-Salt region upon the arrival of the immigrants would have meant a sacrifice of this one feature which made life possible and the adoption of a habitat even more inhospitable, for the only routes open to them were west and south. The wholesale movement of a large population to an undeveloped territory would doubtless have led to disastrous results, and it is not too much to believe that the Hohokam were aware of this. The Pima exhibited no desire to move from the Gila Basin when white settlement started,

about the time of the Salado thrust and it is quite possible that they were built as a protective measure against the Salado.

¹⁵ Schroeder, 1940, p. 152, *et seq.*

¹³ Schroeder, 1940, p. 152.
¹⁴ The studies now in progress by the Department of Anthropology, University of Arizona, and the Arizona State Museum, are throwing light on this problem. Many of the fortified hills of Papagueria date from

and they, like the Hohokam, also had investments in canals.¹⁶

We are equally ignorant as to whether or not one group achieved dominance over the other. The Hohokam were unquestionably impressed by the multi-storied houses, a type of dwelling they were unaccustomed to, but to even the score, the Salado must have felt the same emotion on seeing the achievements of the Hohokam in their irrigating systems. To what extent these factors, or others quite as indeterminable, helped to give one or the other group the upper hand, is a matter of pure speculation.

The Classic Period was brought to a close about 1400 A.D., certainly by 1450, by drastic changes. These were the break-up of the large centers of population, as Los Muertos and Casa Grande, and the loss of high cultural attainment. Outstanding in this upheaval was the exodus of the Salado people. Both the evident reduction of the population and the cultural decline is usually considered to be the consequence of the Salado departure. Thus, while there is no evidence that they stayed, there is also no absolute proof that they left, a phenomenon which we have come to accept more or less as dogma. The failure to find direct traces of the Pueblos after the Classic Period, purely negative evidence, has been accepted at face value to indicate that they were no longer there.

Cushing himself was firmly convinced that earthquakes were responsible. He relates:¹⁷ "that such disturbances were the cause of the abandonment of at least the lower Gila and Salado cities, seems indisputable, to my mind, after a careful examination which I was enabled to make of their condition and distribution of the remains they contained, and especially of the occurrences there of earthquake sacrifices, kindred to, though much more extensive than those made in modern Zúñi on

occasion of even slight earth-tremors or landslides."

Being somewhat more explicit, he says:¹⁸ "that there were abandoned within their walls all that was best; and when we find long rows of houses, in certain directions, tumbled down in true earthquake fashion, the roofs burned by the hearth-fires that were burning even when they fell, skeletons crushed under them, and finally, more significant than all, actually, at least in some of these cities, Earthquake Ceremonial Appliances."

The occurrence of earth-tremors in the Southwest is a matter of seismographic record and the intensity of disturbances is attested by any account of the so-called Sonoran earthquake of May, 1887. It would be unwise, therefore, to say that a phenomenon of this sort might not be responsible for the breaking up of the communities. But the finding of tumbled down houses and burnt roofs—the evidence adduced for earthquake destruction—is of such common occurrence in all parts of the Southwest and represents so many different horizons that the earthquake theory seems quite inadequate. After a quick and unexpected destruction by an earthquake, we should find the rooms containing all the articles of domestic use. Pottery should have been abundant in the more than 235 mapped and excavated rooms, but only about 80 vessels were found. Numerous stone implements did occur in rooms, but this condition prevails everywhere. Furthermore, an earthquake of sufficient force to cause the abandonment of all large villages would certainly have done more damage than is apparent to the standing walls of Casa Grande and the less substantial walls of the adjacent building.

Actually the cause which brought about the changes in the Gila-Salt area, also affected the Salado Culture in its home territory farther east, including even practically all of the area

¹⁶ Russell (1908, p. 87) states that the early writers report the Pimas using canals much larger than they needed. Presumably these were prehistoric ditches. All Pimeria Alta tribes are said to have practised agriculture when seen by the whites and the San Pedro and Santa Cruz valleys are specifically picked out as the places where irrigation was on a wide scale. (Bolton, 1936, pp. 248, 367, 503.) Whether the failure to

mention irrigation among the Gila Pimas was an oversight or whether they didn't have it at the end of the seventeenth century might be argued. But if irrigation was established in the other valleys, it must also have been in the Gila because without it, people in any number could not have existed there.

¹⁷ Cushing, 1890, pp. 186-187.

¹⁸ Cushing, 1890, p. 187.

below the Mogollon Rim. The exodus of the Salado was thus once again but a part of a wholesale movement. Gladwin¹⁹ feels that the shifts and rearrangements of people at this time can be linked with the advent of the Apache. Certainly some such cause, potentially a threat to a very large area, must be invoked. There is no indication that people other than the Apache were in the area since the Pueblos left it. But if the Apache are held responsible, presumably penetrating Arizona from the east, and if the Salado withdrew to the east as Gladwin implies,²⁰ the Pueblos were then moving against the very people who are supposed to have driven them out. This does not seem likely. As yet, the proof which may be offered in support of any view involving a hostile people in forcing the Salado out is slight and in inverse proportion to the importance of the problem.

There may also have been more purely local causes which helped to bring to an end the thriving communities of the rich desert valleys. To mention some possibilities: internal strifes,²¹ the exhaustion of the soil by over-cultivation, sterilization, and clogging of the land by silt-laden alkaline irrigation waters, and the failure of the canal systems — whether through lack of water, excessive erosion, or simply the inability on the part of the people to maintain them in the face of trouble. Crop failure, whatever the cause, would have been one of the speediest means of bringing ruin and disaster to a people so dependent upon agriculture.

In any event we can be sure that disintegration took place and that the Pueblo element of the population left the region. Where they went is as debatable as the cause of their going. By elimination, west and north may be excluded as possible routes of emigration because no Salado remains occur there. But to the east and southeast, Salado ruins are abundant. The question arises as to whether or not these were contemporaneous with those of the Gila-Salt area, dating from the great expansion period at

about the dawn of the fourteenth century, or, whether they post-date that expansion. In the latter event, they could easily represent the re-establishment of the Saladoans from the west, a view which Mr. Gladwin favors by implication.²² Unfortunately tree-ring dates are not available to determine the age of the eastern sites and no one has yet produced good evidence, ceramically or otherwise, to show that they are much later than 1400. The high development of Chihuahua was reached about simultaneously with the late Salado as seen in the mutual interchange of pottery, and there seems little justification for believing the Saladoans withdrew to that area, lock, stock, and barrel. The point is that archaeologists do not know what the fate of the Salado people was. I do not think it is beyond the realm of possibility that they withdrew to, and were speedily amalgamated by, such a group as Zuni, but evidence for this is equally hard to produce.

If it is admitted that the Salado left the Gila-Salt area, then what was the fate of the remaining Hohokam? Did they accompany the Salado, did they remain behind (and it may be safely assumed, I believe, that there were Hohokam left with tribal integrity more or less intact), or did they withdraw in another direction? Gladwin²³ categorically excludes the first possibility and the evidence — or lack of it — supports the view. But at the same time the suggestion²⁴ that the Hohokam retreated to Papagueria is insupportable. No traces of the Gila Basin Hohokam of the Classic Period, other than trade pieces, have turned up there.²⁵ Instead there was a local contemporaneous and related group with its own cultural hallmarks. Even the canals of Papagueria,²⁶ limited to small systems by environment and late chronologically, were certainly built by local residents and not by Gila Basin Hohokam who had come down and were trying to carry on agriculture as they had known it.

The last possibility, that the Hohokam remained behind, seems to me to be the most

¹⁹ Gladwin, 1937, pp. 101-102.

²⁰ Gladwin, 1937, p. 101.

²¹ Pimas told Manje in Kinos' time that Casa Grande was built by a people who had come in from the north and who later separated as the result of some disagreement and returned to the north. (Russell, 1908, p. 370.)

²² Gladwin, 1937, p. 101.

²³ Gladwin, 1937, p. 105.

²⁴ Gladwin, 1937, p. 105.

²⁵ Even if their stay had been short, it seems that some indications would have been found during the three seasons of archaeological work of the University of Arizona.

²⁶ Withers, 1941, pp. 7-9.

likely explanation. Some evidence for this, though slight, was the finding²⁷ of Hohokam pithouses cut into Salado refuse of Compound F of Casa Grande, showing that old-style unit-type Hohokam houses were still being built after the cellular compact Salado buildings had been abandoned. The Hohokam, long used to the *rancheria* form of existence, which they had left in favor of centralized life at the beginning of the Classic Period, apparently reverted to scattered living after the breakdown of the larger communities started. If canal failure was involved, their settlements would, of necessity, be near the streams. With a thorough knowledge of irrigation, which could still be practised but on a much lesser scale than before, and with a familiarity with the peculiar conditions of their environment, life was possible. The pattern of this existence was precisely that of the Pima when first seen by white man in the same territory only a few centuries later.

Up to the present time no sites have been identified certainly as dating in the period from 1400 to 1700. But it must also be admitted that no serious search, especially in the Gila Basin, has been made. The scattered life, postulated above, would make the houses difficult to find, and with a weakened culture there would undoubtedly be very little to find. All in all, there seems little reason for believing that there was a complete displacement of the people in the Gila Basin in proto-historic times.

The Pima mirror the culture of the Hohokam in so many respects that no matter how enthusiastically one tries to prove otherwise, they still remain, logically, the descendants of the Hohokam. To mention some of the parallels specifically: a *rancheria* form of existence; basically the same form of architecture; canal irrigation; paddle-and-anvil pottery; red-on-buff painted pottery; griddles; effigy vessels, simulating those of the Hohokam even to the character of the tattooing; mats of a type impressed on griddle bottoms; and cultivation of cotton. The outstanding trait which did not continue was the treatment of the dead. If this suggested linkage is valid, sometime between the end of the Classic Period and the early his-

toric era, there was a change from cremation to inhumation. This may actually have begun to take place during the Civano Phase, when the Hohokam were thrown together with the Salado who customarily buried.

The changes in Hohokam Culture from the Vahki to the Soho Phases were as great, or greater, than were the changes in a projected sequence carrying the culture from the Soho Phase to modern Pima.

What has become glaringly perceptible in the preceding pages is the fact that the larger problems, on present evidence, are incapable of solution. This seems to me to point up the direction which further research should take.

In spite of the valuable results of Gila Pueblo's Snaketown studies, we are still ignorant of the beginnings of the Hohokam Culture. Did its roots penetrate the pre-agricultural, food-gathering levels of culture of Pluvial and post-Pluvial times; or was it a migrant culture, arriving with agriculture and pottery established?

Further intra-cultural distinctions need to be made to allow a more intelligent use of phase diagnostics. The Santan Phase of late Sedentary times, for example, needs strengthening, and the significance of the change from *rancheria* to centralized living between the Sedentary and Classic Periods should be determined. Then came the Salado migration. Why? What effects did it produce? Not enough attention has been paid the regional differences of the Salado Culture, both with respect to kind and time. Until this is done, movements subsequent to the exodus from the Gila-Salt region cannot be traced.

There is also the all-important period from 1400 to 1700 which, for all of southern Arizona, is still factually blank. Only on the strength of what can be produced in the way of human history for this interim can it be definitely stated that the Pima are modern Hohokam.

Determining the physical side of the Hohokam is another urgent need. The difficulty of obtaining proof for this from the cremated remains is almost insurmountable, and our knowledge will undoubtedly have to come from chance burials or from areas occupied by the

²⁷ By the Van Bergen-Los Angeles Museum Expedition, in 1930.

Hohokam but where cremation was not practised.

Looking beyond the inner sphere of the Hohokam, how far did their influence reach and to what extent were they affected by other people? We know from cross-finds²⁸ that the Hohokam and Anasazi were in trade contact by the seventh or eighth centuries, and that some borrowing took place is becoming evident. Also, what is the meaning of the apparent early ceramic similarities of the Hohokam and Mogollon groups?²⁹ By the eleventh century certain links between the Gila Basin and the Mimbres drainages were apparent: shell carvings, palettes, three-quarter grooved axes, hoes, notched stones, sometimes used in supporting the elevated floors in pithouses, and some similarities in ceramic art.

The field of Mexican-Hohokam relationships has not been fully determined. How are we to interpret such traits as figurines, legged vessels, spindle whorls, griddles, copper bells, nose plugs, bird-serpent symbolism, mosaic plaques (mirrors), ball courts, rubber balls, and stone carving³⁰ among the Hohokam? About all we can say now is that certain traits were shared, and that if these represent diffusion from the south, they did not go north as a cluster, but

more probably individually from different sources in Mexico and at different times.

The work of the Hemenway Expedition has given us indirect help in sharpening the definition of some of the problems outlined above. Specifically, in addition to providing us with a record of what was probably the largest pre-Spanish community in the Gila-Salt region — the remains of which have long since been destroyed — the Los Muertos and Las Acequias collection offers a very full picture of the imperishable material culture of the Classic Period. This period, much discussed but poorly documented, can stand on its own feet materially, at least, as a result of Cushing's efforts. While he did not recognize them as such, the Los Muertos and Las Acequias specimens represent the tangible possessions of two ethnic groups — the indigenous Hohokam and the immigrant Salado — who shared villages for a time during the fourteenth century without much blending of the strains. We have in this collection a sound basis for further comparative study as to both intra-cultural and inter-cultural aspects.

²⁸ Haury, 1940, pp. 85-86, 95-96.

²⁹ Gladwin, Haury, Sayles, and Gladwin, 1937, p. 229.

³⁰ Particularly such a Chac Mool-like figure as illus-

trated from Snaketown (Gladwin, Haury, Sayles, and Gladwin, 1937, pl. LXXVI).



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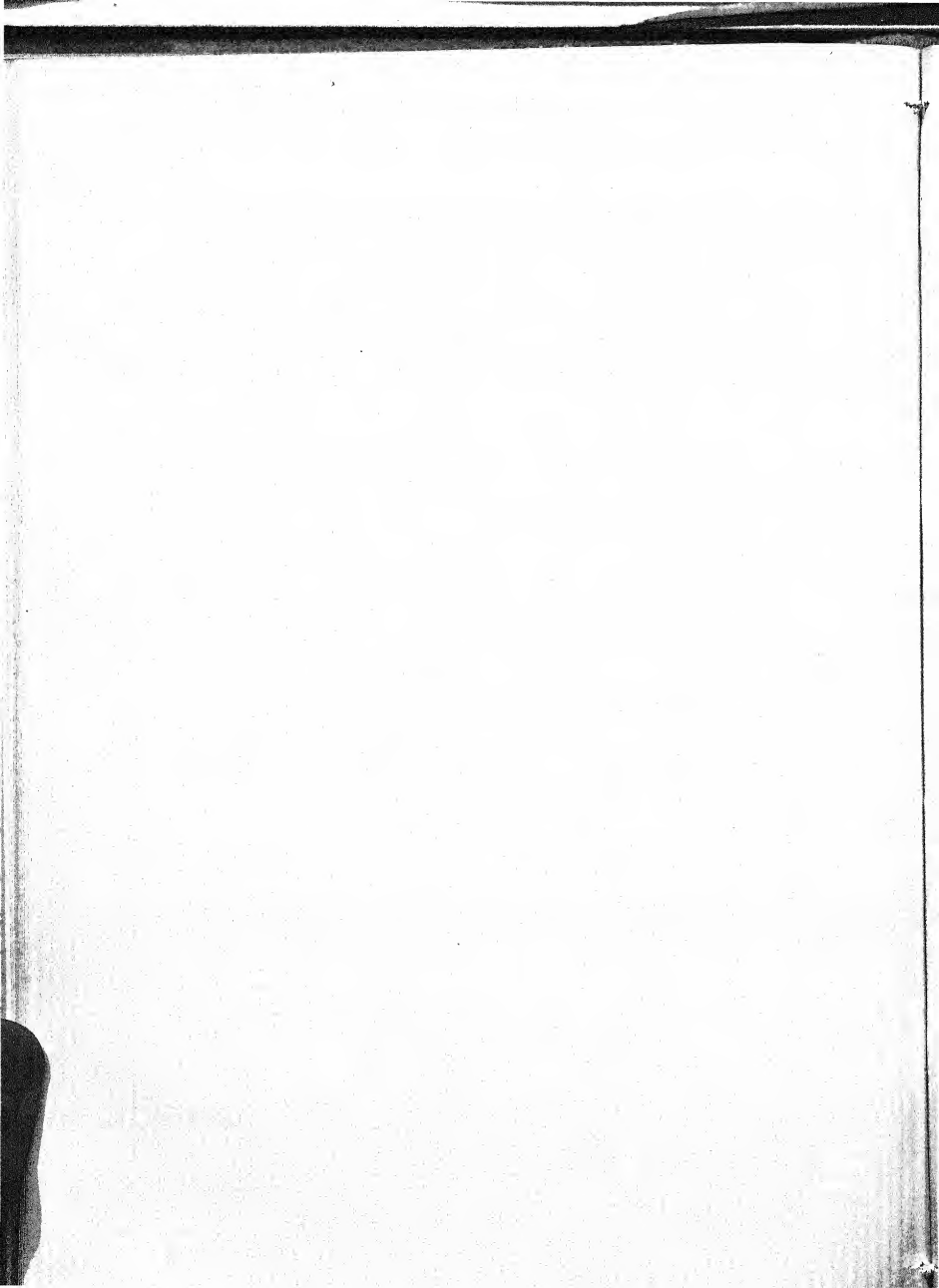
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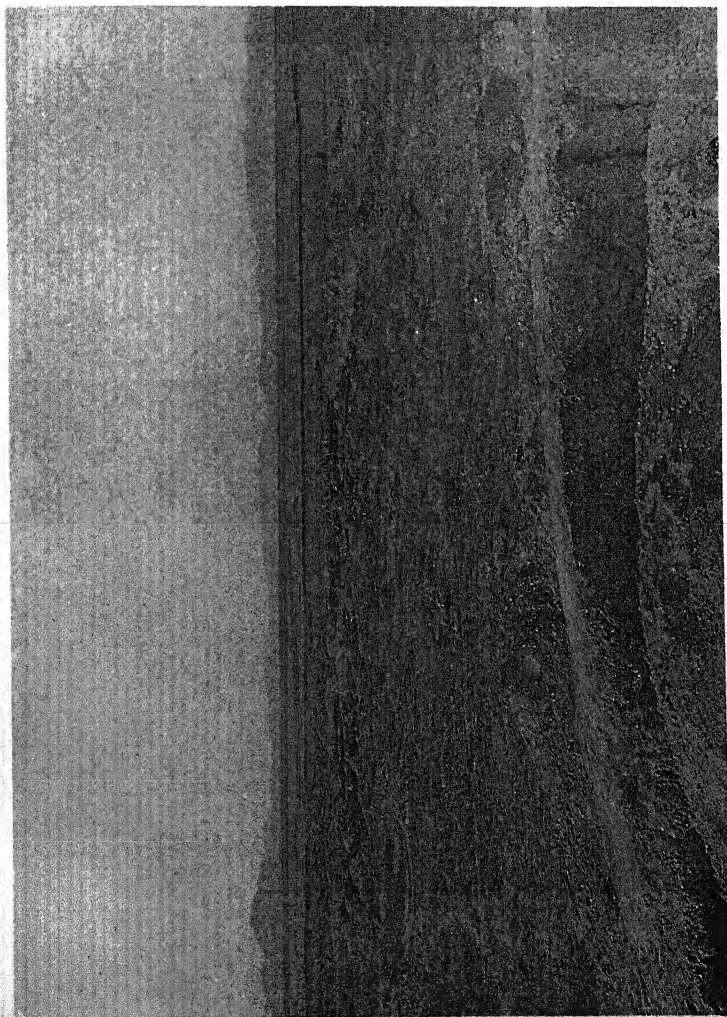
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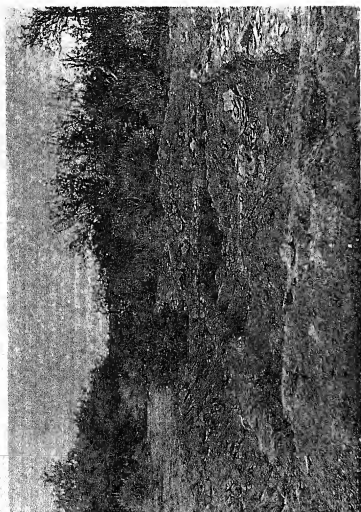
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PLATES

PLATE I. LOS MUERTOS. THE NORTH WALL OF RUIN I,
LOOKING ACROSS THE FLATS TO DIGGINGS IN RUINS XII,
XIII, AND XIV.





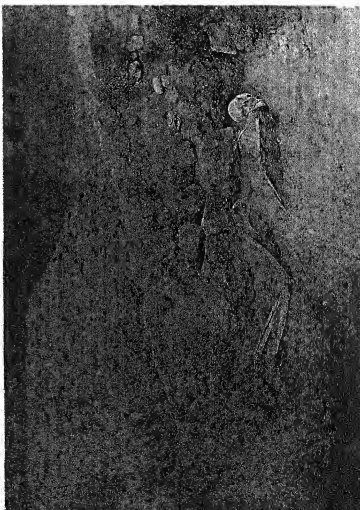
b



b



a



c

PLATE 2a. LOS MUERTOS, RUIN II. LOOKING SOUTHWEST OVER A PART OF THE RUIN, SHOWING ARTIFACTS *IN SITU*. A burial may be seen in the immediate foreground.

PLATE 2b. LOS MUERTOS. A PARTLY EXCAVATED ROOM LOCATED BETWEEN RUINS IV AND V (PROBABLY ROOM *f*), LOOKING EAST.

PLATE 2c. LOS MUERTOS. SKELETON OF A MAN IN ROOM *k*, RUIN VII. Supposedly caught by a wall thrown over by an earthquake.

PLATE 2d. LOS MUERTOS. TWO SUB-FLOOR PITS UNCOVERED IN ROOM *b* OF RUIN XIII. Possibly used for storage.

PLATE 3a. ROOM 1 OF RUIN XVII, SHOWING A DOOR IN THE DISTANT WALL. The occurrence of numerous axes in rooms is not an uncommon feature in the Gila-Salt region.

PLATE 3b. LOS MUERTOS, RUIN XIII. A DOUBLE BURIAL OF A MALE AND FEMALE.

PLATE 3c. LOS MUERTOS, RUIN XX. GRAVE OF YOUNG FEMALE.

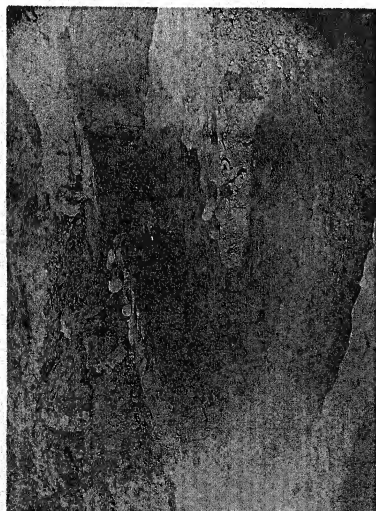
PLATE 3d. LOS MUERTOS, RUIN I. BURIAL IN A SO-CALLED "SARCOPHAGUS."



b



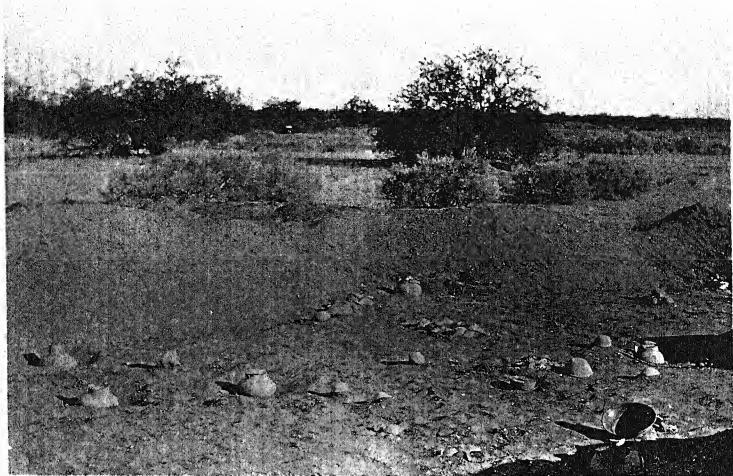
a



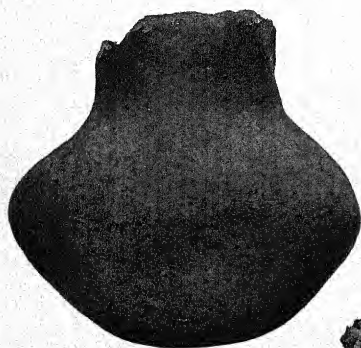
d



c



a



b



PLATE 4a. LOS MUERTOS, RUIN XXI. PYRAL CEMETERY EAST
OF RUIN, LOOKING SOUTH.

PLATE 4b. LOS MUERTOS. CREMATION URN WITH ASHES
REMOVED TO SHOW THE CHARACTER OF THE BONES.

PLATE 5. LOS MUERTOS. SANTA CRUZ (*a-c*) AND SACATON (*d-i*) RED-ON-BUFF SHERDS. Probably drift pieces from a nearby early site. Width of *i*, about 3 inches.

PLATE 6. LOS MUERTOS. CASA GRANDE RED-ON-BUFF JARS. Low-necked (*b*) and tall-necked (*a* and *c*) types. Figures *a* and *d* show mold impressions. Diameter of *d*, 12½ inches.

PLATE 7. LOS MUERTOS. CASA GRANDE RED-ON-BUFF VESSELS. Bowls (*a, b*), canteen (*c*), and pitchers (*d, e*). Height of *e*, 6 inches.

PLATE 8. LOS MUERTOS. POTTERY FOREIGN TO LOS MUERTOS, TANQUE VERDE RED-ON-BROWN. Width of *a*, 6 inches.

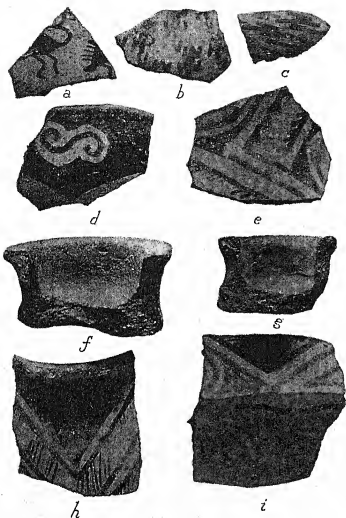


PLATE 5



PLATE 7

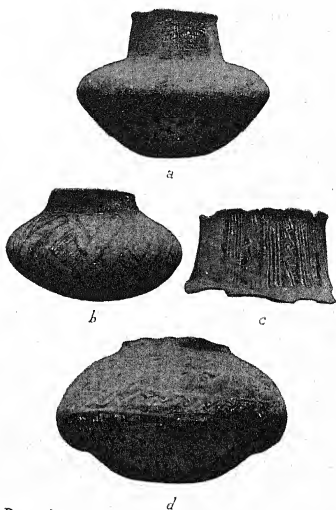


PLATE 6

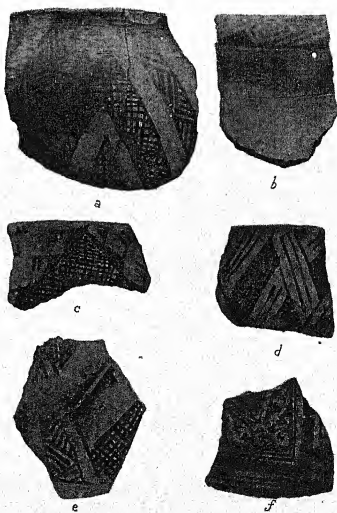


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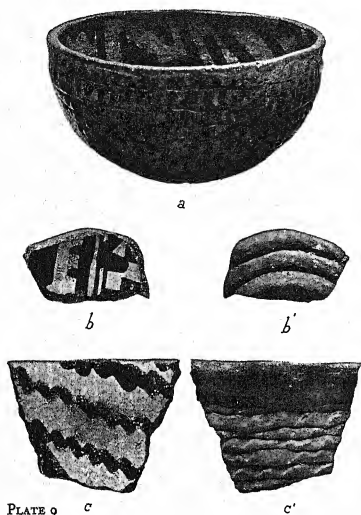


PLATE 9

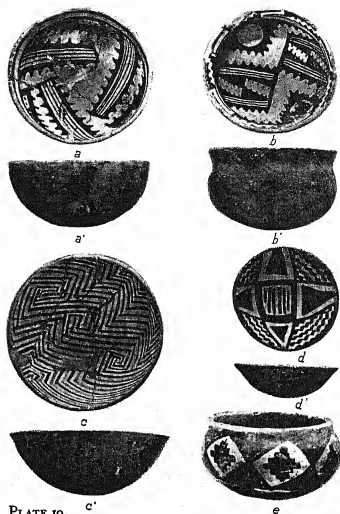


PLATE 10



PLATE 11



PLATE 12

PLATE 9. LOS MUERTOS. GILA POLYCHROME BOWL AND
SHERDS SHOWING THE EVIDENCE OF A COILED TECHNIQUE.
Diameter of *a*, 4½ inches.

PLATE 10. LOS MUERTOS. GILA POLYCHROME BOWLS EM-
PHASIZING VARIATIONS IN SHAPE. Diameter of *a*, 6½ inches.

PLATE 11. LOS MUERTOS. GILA (*b*, *c*, *e*) AND TONTO (*a*, *d*)
POLYCHROME VESSELS. Height of *e*, 5 inches.

PLATE 12. LOS MUERTOS. LARGE GILA (*a-c*, *e*) AND TONTO
(*d*) POLYCHROME JARS. Diameter of *a*, 12 inches.

PLATE 13. LOS MUERTOS. FRAGMENTS OF EFFIGY JARS IN GILA AND TONTO POLYCHROME, (a-d) bird, (e) animal, (f) human. Width of a, $3\frac{7}{16}$ inches.

PLATE 14. LOS MUERTOS. LARGE SALT RED JAR, SHOWING INTENTIONAL FIRING CLOUDS. Diameter, $16\frac{1}{4}$ inches.

PLATE 15. LOS MUERTOS. GILA AND SALT SMUDGED BOWLS. Diameter of i, $19\frac{1}{2}$ inches.

PLATE 16. LOS MUERTOS. SALT SMUDGED BOWLS. Diameter of b, $9\frac{1}{2}$ inches.



a



b



c



d



e



f

PLATE 13



a



b



c



d



e



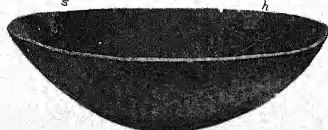
f



g



h

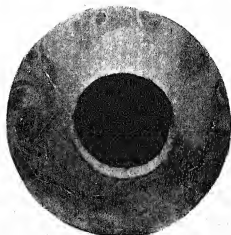


i

PLATE 15



a



a'

PLATE 14



a



b



c



d



e



f



g



h



i

PLATE 16

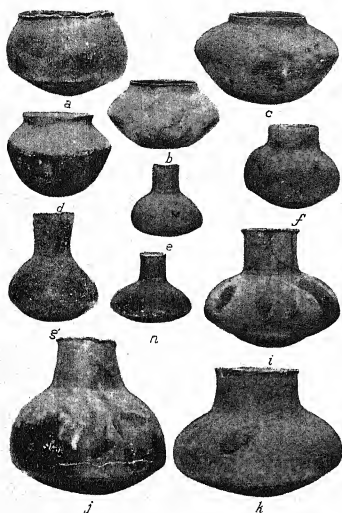


PLATE 17

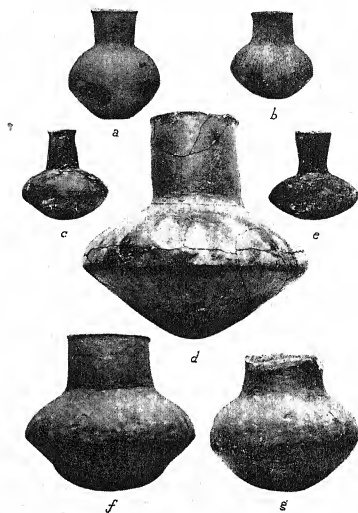


PLATE 18



PLATE 19

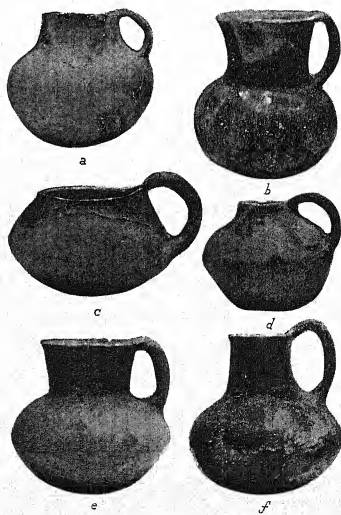


PLATE 20

PLATE 17. LOS MUERTOS. SALT RED SHOULDERED JARS.
Diameter of *j*, 12¼ inches.

PLATE 18. LOS MUERTOS. GILA AND SALT RED SHOULDERED
JARS. Diameter of *g*, 16 inches.

PLATE 19. LOS MUERTOS. GILA AND SALT RED JARS. Diameter
of *i*, 14 inches.

PLATE 20. LOS MUERTOS. GILA AND SALT RED PITCHERS.
Height of *b*, 5½ inches.

PLATE 21. LOS MUERTOS. SALT RED BIRD EFFIGIES (*a-e*),
MUGS (*f, g*), AND BEAKERS (*h-j*). Height of *g*, 8 inches.

PLATE 22. LOS MUERTOS. GILA PLAIN JARS. Diameter of *a*, 12
inches.

PLATE 23. LOS MUERTOS. GILA PLAIN VESSELS. Diameter of *c*,
12 $\frac{1}{4}$ inches.

PLATE 24. LOS MUERTOS. INTRUSIVE DECORATED SHERDS.
Length of *m*, 3 inches.



PLATE 21



PLATE 23

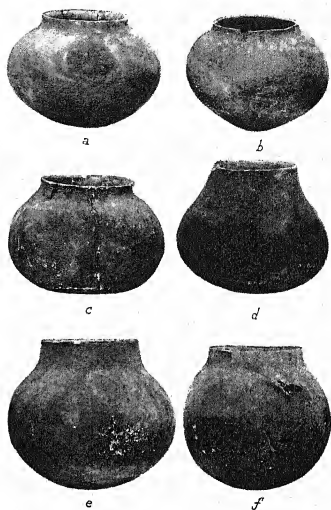


PLATE 22

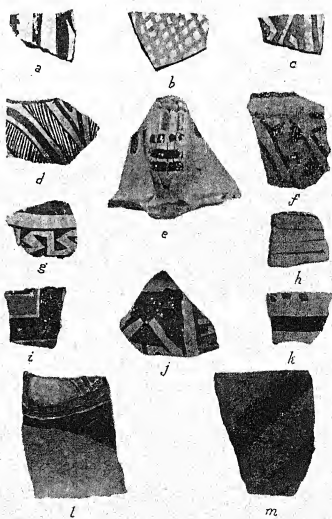


PLATE 24

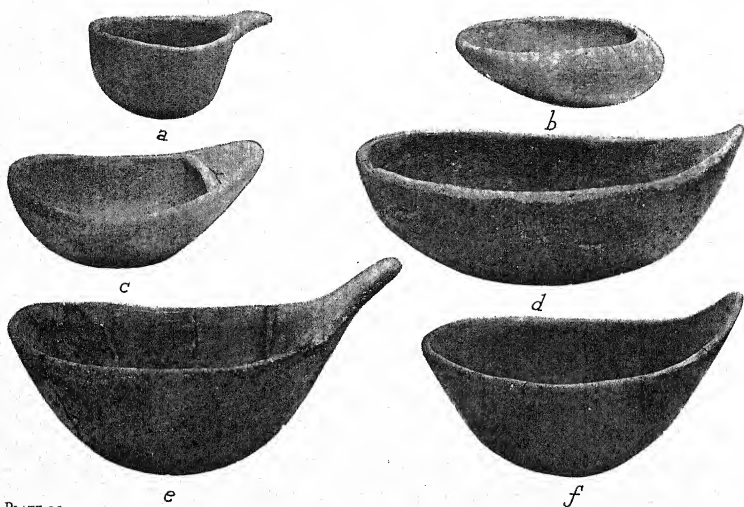


PLATE 25

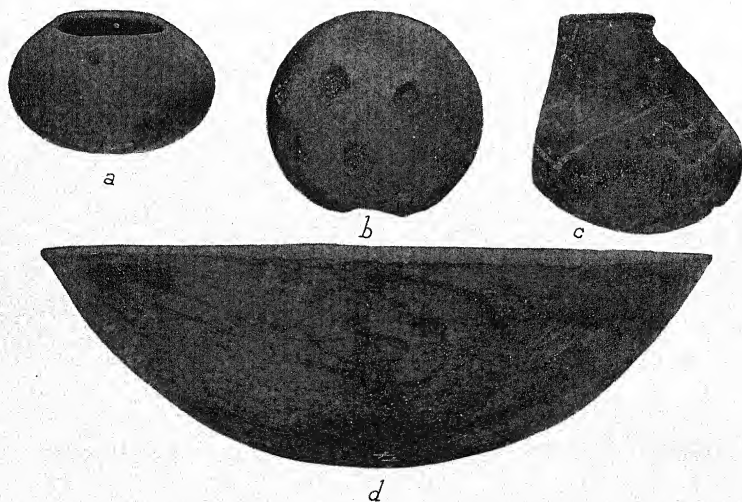


PLATE 26

PLATE 25. LOS MUERTOS. SALT RED SCOOPS. Length of *d*, 8½ inches.

PLATE 26. LOS MUERTOS. SMALL INCURVED VESSEL (*a*), BOTTOM VIEW OF TRIPOD VESSEL (*b*), WHITE-ON-RED JAR (*c*), AND RED WARE BOWL WITH BLACK EXTERIOR PATTERN (*d*). Diameter of *d*, 13 inches.

PLATE 27. LOS MUERTOS. INTRUSIVE NECK-CORRUGATED
JAR SHERDS. Width of *a*, 4 inches.

PLATE 28. LOS MUERTOS. TOP (*a-c*) AND BOTTOM (*a'-c'*)
VIEWS OF EARTHENWARE GRIDDLES. Diameter of *c*, 1 3/4 inches.

PLATE 29. LOS MUERTOS. FRAGMENTS OF PERFORATED
PLATES. Width of *e*, 4 inches.

PLATE 30. LOS MUERTOS. SPINDLE WHORLS (?) MADE FROM
POTSHERDS. Diameter of *c*, 2 inches.

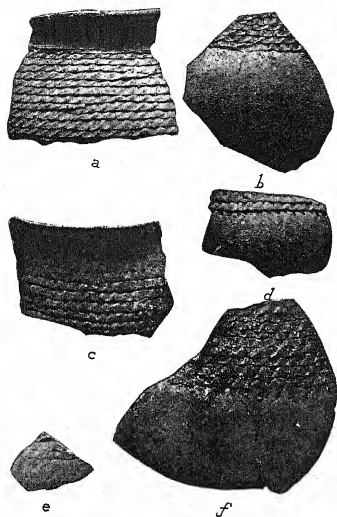


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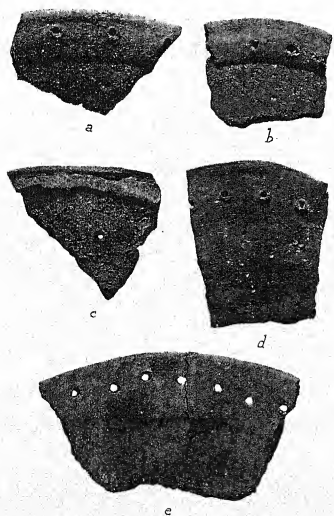


PLATE 29

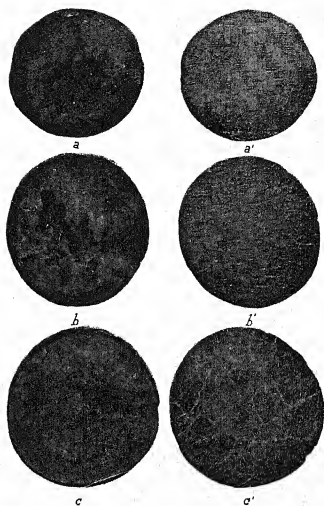


PLATE 28

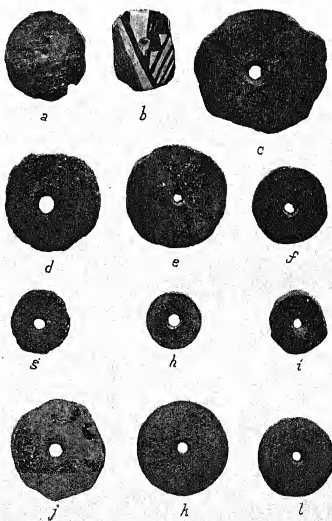


PLATE 30

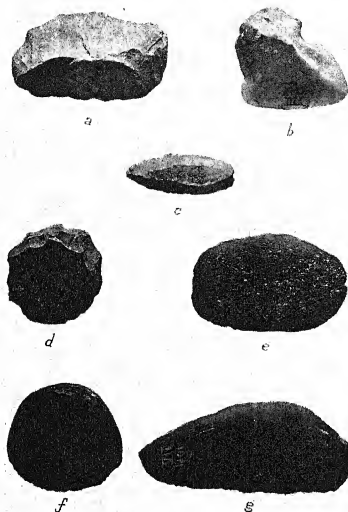


PLATE 31

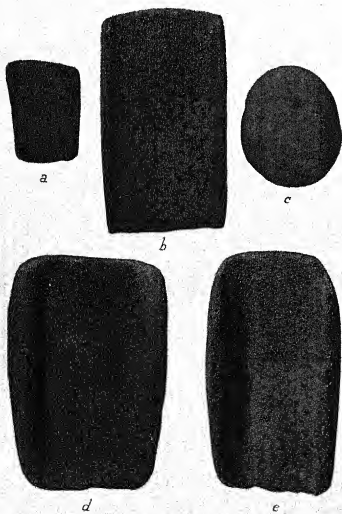


PLATE 33



PLATE 32

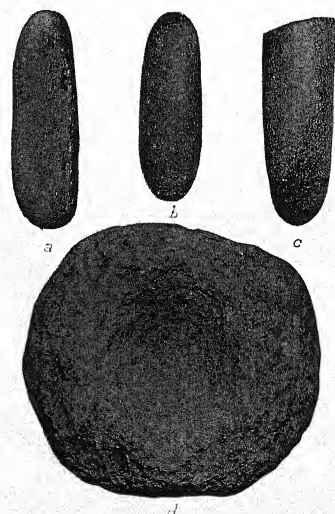


PLATE 34

PLATE 31. LOS MUERTOS. KNIVES OF CHERT (*a, b*), QUARTZITE (*c*), AND DIORITE (*d-g*). Length of *g*, 5 inches.

PLATE 32. LOS MUERTOS. PICKS (*e, f*), CHIPPED AND NOTCHED BLADES (*a-d, g*). Length of *e*, 17 inches.

PLATE 33. LOS MUERTOS. METATE TYPES. Length of *b*, 18 inches.

PLATE 34. LOS MUERTOS. PESTLES (*a-c*) AND MORTAR (*d*). Length of *a*, 9½ inches.

PLATE 35. LOS MUERTOS. STEMMED ARROW POINTS. Length of n , 2 inches.

PLATE 36. LOS MUERTOS. ARROW POINTS WITHOUT STEMS ($a-i$) AND DRILLS ($j-m$). Length of j , $2\frac{3}{16}$ inches.

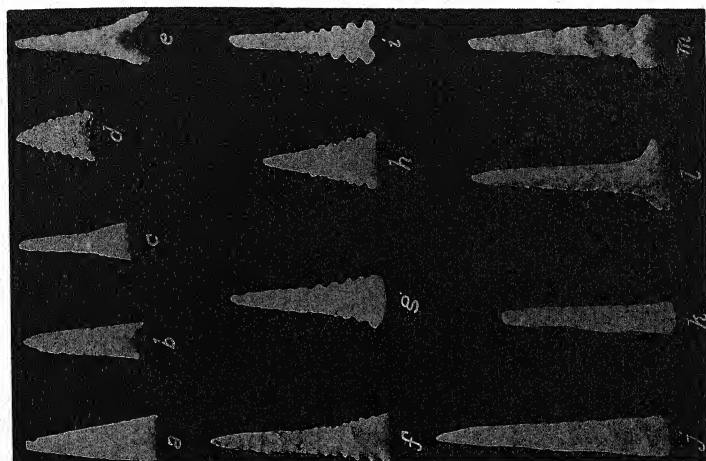


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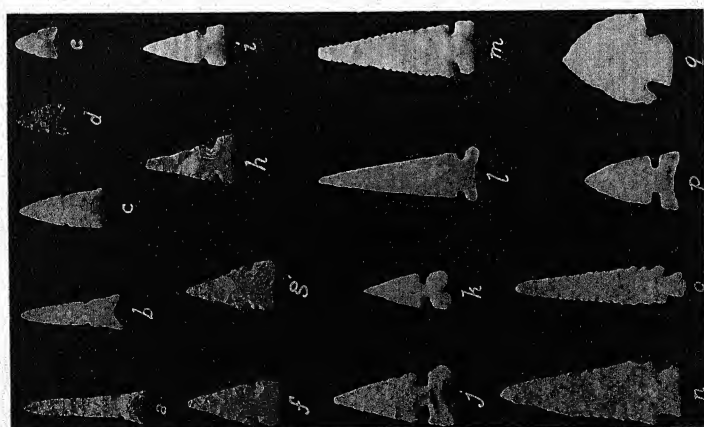


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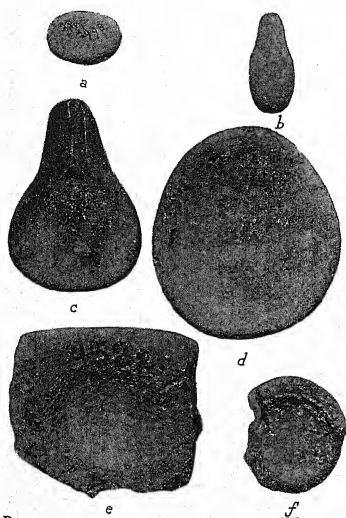


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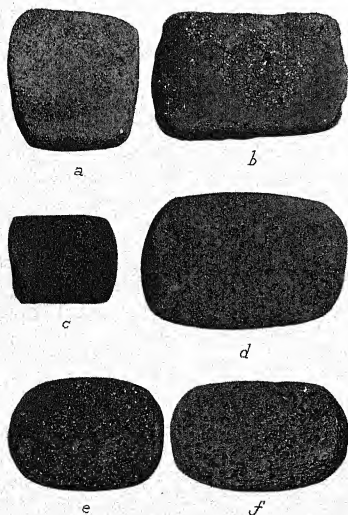


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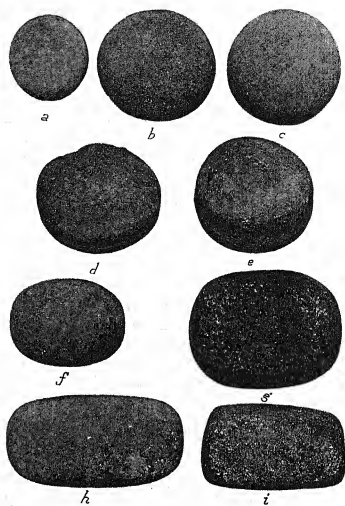


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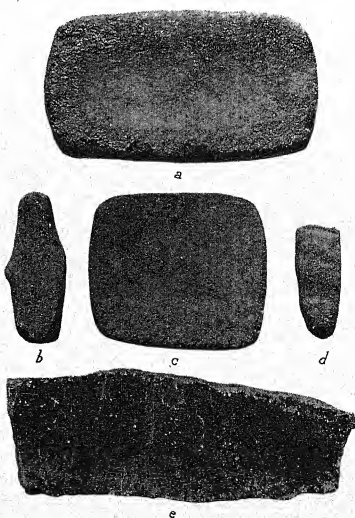


PLATE 40

PLATE 37. LOS MUERTOS. PAINT MORTARS (*a*, *c-f*) AND PESTLE (*b*). Diameter of *d*, 7 inches.

PLATE 38. LOS MUERTOS. FORMS OF RUBBING STONES. Diameter of *b*, 5 inches.

PLATE 39. LOS MUERTOS. RUBBING STONES OF POROUS LAVA. Length of *d*, 6 inches.

PLATE 40. LOS MUERTOS. ABRADING STONES. Length of *e*, 8¼ inches.

PLATE 41. LOS MUERTOS. HAND RASPS. Length of *f*, $3\frac{1}{4}$ inches.

PLATE 42. LOS MUERTOS. HAMMERSTONES. Length of *k*, $4\frac{1}{4}$ inches.

PLATE 43. LOS MUERTOS. TECHNOLOGICAL SERIES. Showing axes in process of manufacture (*a-e*) and an axe reworked after polishing (*f*). Length of *b*, 8 inches.

PLATE 44. LOS MUERTOS. THREE-QUARTER GROOVED AXES SHOWING RANGE IN SIZE. Length of *f*, 10 inches.

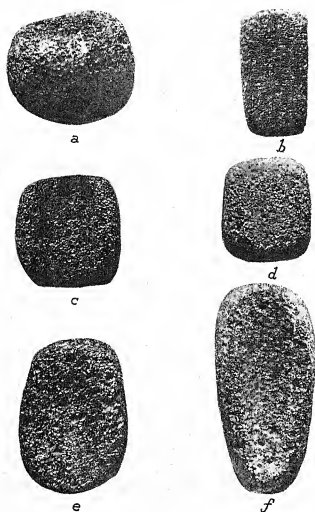


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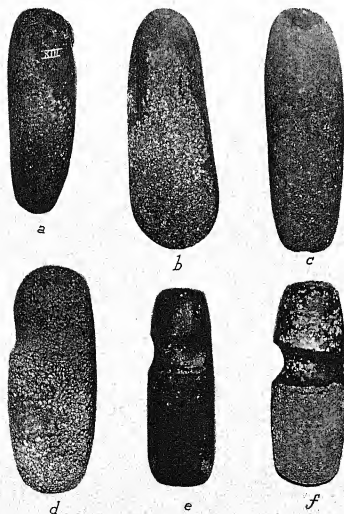


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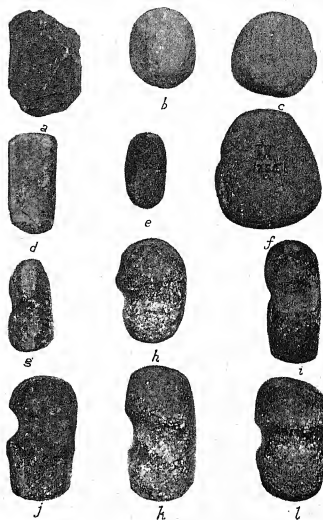


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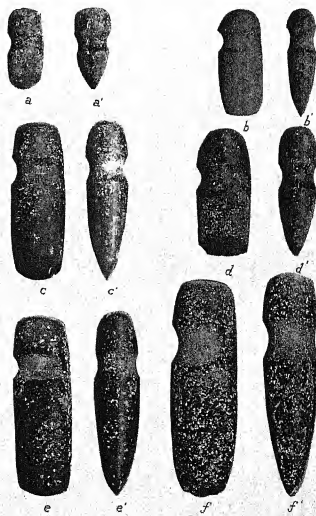


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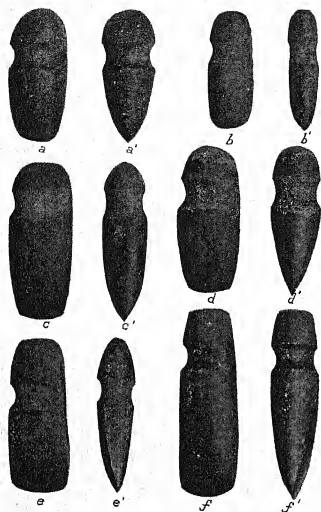


PLATE 45



PLATE 46



PLATE 47

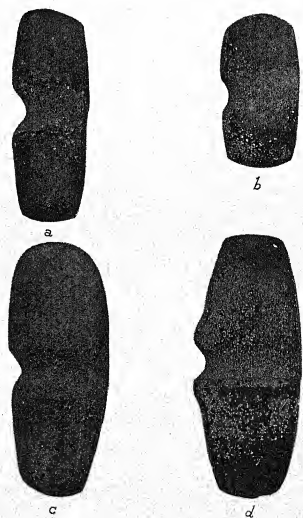


PLATE 48

PLATE 45. LOS MUERTOS. THICK AND SLENDER TYPES (*a, b*) AND AXES WITH VARIOUS PROFILES (*c-f*). Length of *f*, 8½ inches.

PLATE 46. LOS MUERTOS. THREE-QUARTER GROOVED AXES. Showing variations in groove placement. Length of *j*, 9½ inches.

PLATE 47. LOS MUERTOS. TECHNOLOGICAL SERIES OF DOUBLE-BITTED AXES. Length of *a*, 4½ inches.

PLATE 48. LOS MUERTOS. DOUBLE-BITTED AXES. Length of *a*, 6¼ inches.

PLATE 49. LOS MUERTOS. ADZES. Length of *a*, 5½ inches.

PLATE 50. LOS MUERTOS. ROCK SPALLS USED AS HOES OR GRUBBING TOOLS. Length of *c*, 7 inches.

PLATE 51. LOS MUERTOS. HOES WITH SHARPENED EDGES AND UNWORKED ENDS AND BACKS. Breadth of *c*, 10½ inches.

PLATE 52. LOS MUERTOS. RECTANGULAR HOES (*a-c*) WITH CONVEX BACK (*d*). Breadth of *c*, 7 inches.

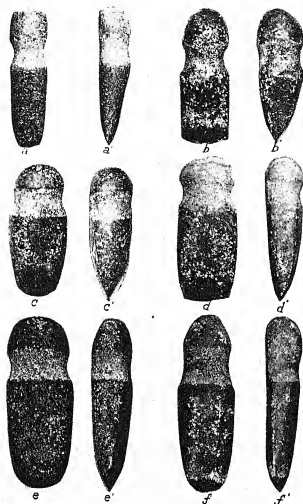


PLATE 49

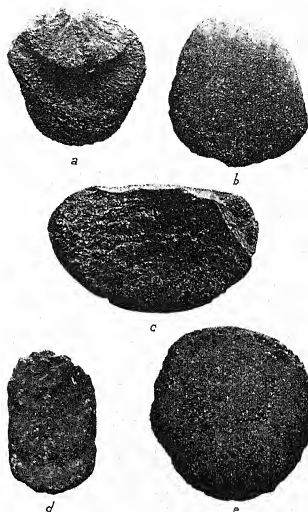


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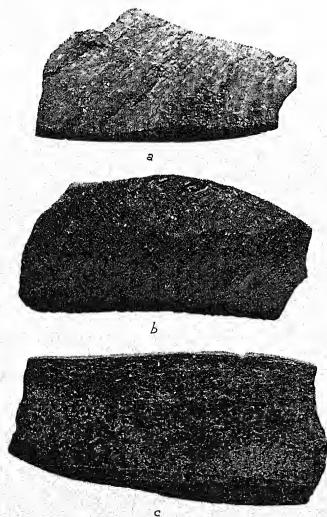


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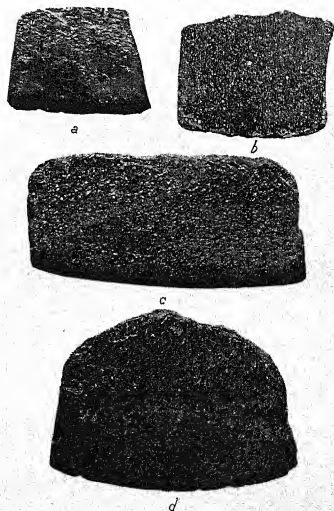
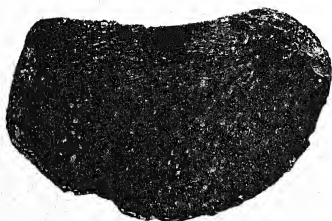


PLATE 52



a



b

PLATE 53



a



b



c

PLATE 54



a



b



c

PLATE 55



a



b

PLATE 56

PLATE 53. LOS MUERTOS. OVAL (*a*) AND LUNATE (*b*) HOES.
Breadth of *b*, 6½ inches.

PLATE 54. LOS MUERTOS. NOTCHED HOES. Breadth of *c*, 6½ inches.

PLATE 55. LOS MUERTOS. HOES. Breadth of *b*, 9½ inches.

PLATE 56. LOS MUERTOS. NARROW HOES. Breadth of *a*, 4 inches.

PLATE 57. LOS MUERTOS. CRUSHERS. Length of *b*, 9 inches.

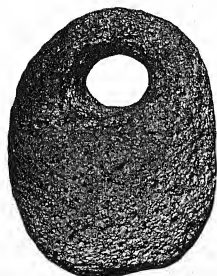
PLATE 58. LOS MUERTOS. CHISELS MADE OF SLENDER
WATER-WORN STONES. Length of *a*, $5\frac{1}{2}$ inches.

PLATE 59. LOS MUERTOS. POTTERY POLISHERS (*a-g*) AND
SCRAPER (*b*). Length of *b*, $5\frac{1}{2}$ inches.

PLATE 60. LOS MUERTOS. ARROW SHAFT STRAIGHTENERS.
Length of *a*, $4\frac{3}{4}$ inches.



a



b

PLATE 57



a



b



c



d



e



f

PLATE 58



a



b



c



d



e



f



g



h

PLATE 59



a



b



c



d

PLATE 60

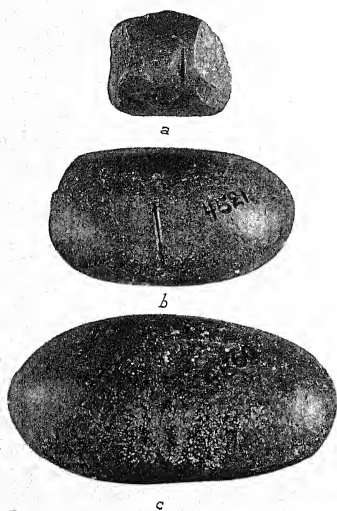


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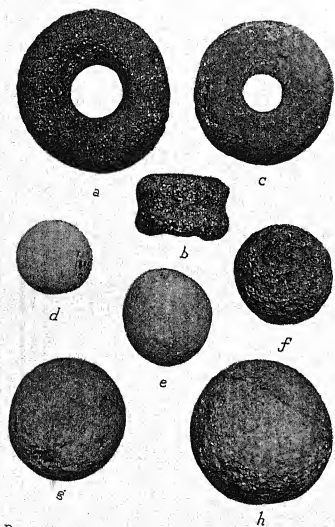


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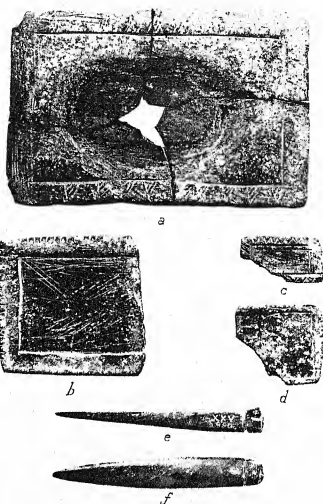


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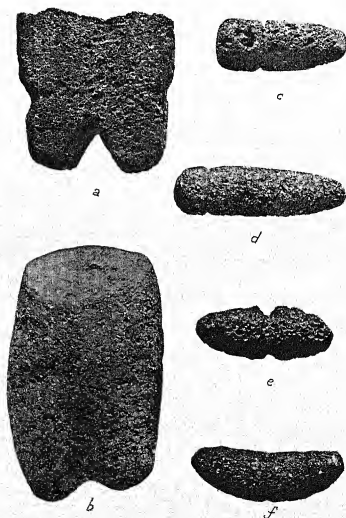


PLATE 64

PLATE 61. LOS MUERTOS. ARROW SHAFT STRAIGHTENERS.
Length of *c*, 12 inches.

PLATE 62. LOS MUERTOS. SLATE PALETTES (*a-d*) AND
POINTED SLATE OBJECTS (*e, f*). Length of *a*, 6½ inches.

PLATE 63. LOS MUERTOS. STONE RINGS (*a-c*) AND BALLS
(*d-b*). Diameter of *a*, 3¾ inches.

PLATE 64. LOS MUERTOS. FRAGMENTS OF ANIMAL EFFIGIES
(*a, b*) AND "MEDICINE" STONES (*c-f*). Length of *b*, 3¼ inches.

PLATE 65. LOS MUERTOS. STONE DISCS (*a-d*) AND SPINDLE WHORLS (*e-h*). Diameter of *b*, $2\frac{1}{2}$ inches.

PLATE 66. LOS MUERTOS. STONE PENDANTS. Length of *d*, $2\frac{3}{4}$ inches.

PLATE 67. LOS MUERTOS. ODDLY SHAPED NATURAL STONES. Length of *a*, $1\frac{1}{2}$ inches.

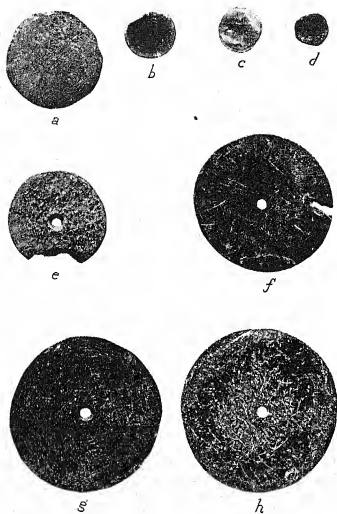


PLATE 65

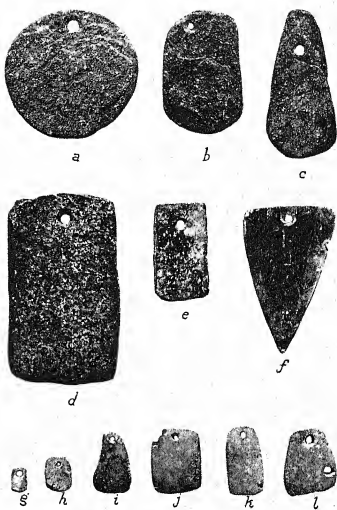


PLATE 66

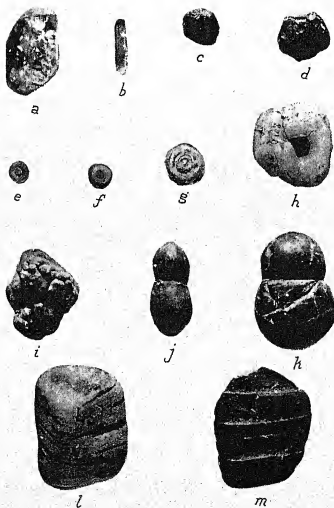


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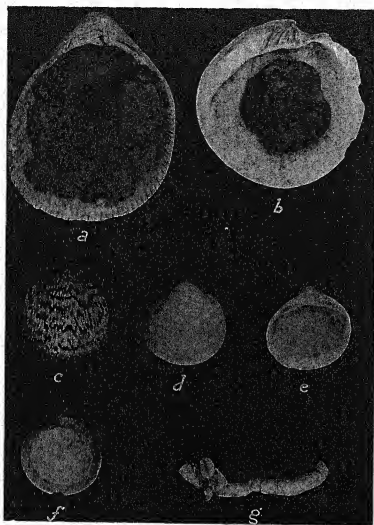


PLATE 68

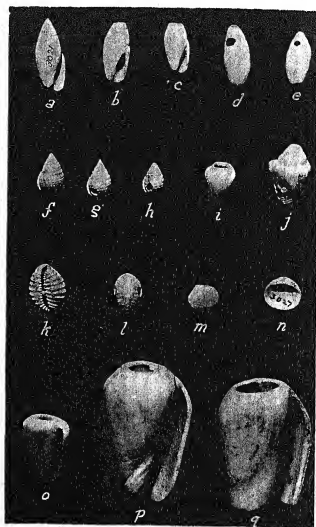


PLATE 69

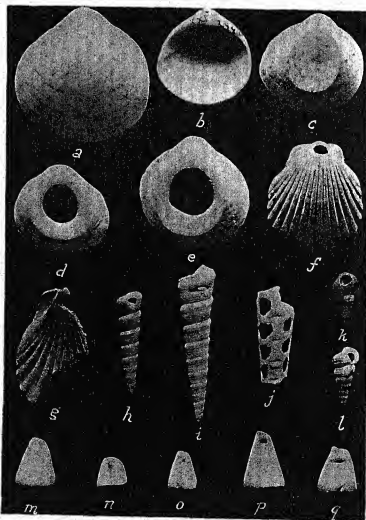


PLATE 70

PLATE 68. LOS MUERTOS. UNWORKED SHELL. Length of *a*,
 $5\frac{1}{2}$ inches.

PLATE 69. LOS MUERTOS. WHOLE SHELL BEADS. Length of *p*,
 $1\frac{1}{4}$ inches.

PLATE 70. LOS MUERTOS. WHOLE SHELL PENDANTS (*a-l*)
AND TINKLER PENDANTS (*m-q*). Length of *i*, $2\frac{1}{4}$ inches.

PLATE 71. LOS MUERTOS. BRACELETS IN PROCESS OF MANUFACTURE (*a-e*) AND FINISHED BRACELETS (*f, g*). Diameter of *a*, $1\frac{1}{2}$ inches.

PLATE 72. LOS MUERTOS. SHELL RINGS. Diameter of *d*, 1 inch.

PLATE 73. LOS MUERTOS. SHELL TRUMPETS. Length of *a*, $6\frac{1}{2}$ inches.

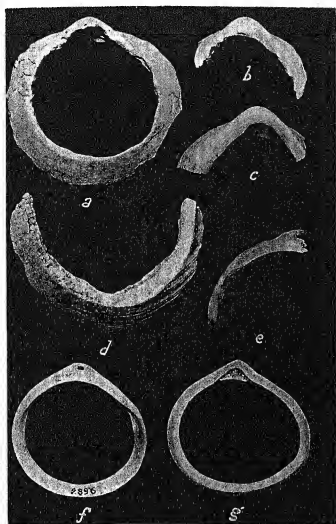


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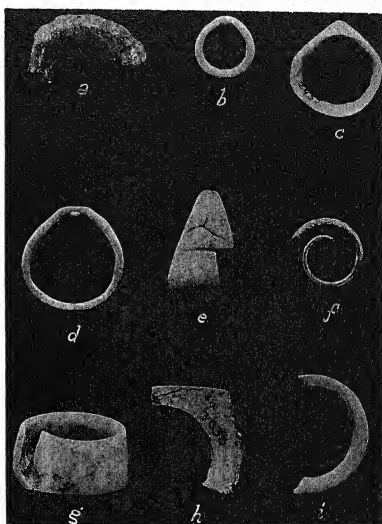


PLATE 72

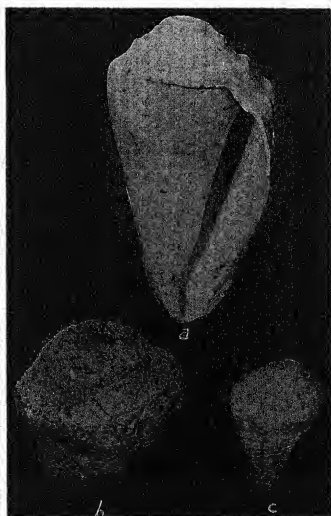


PLATE 73

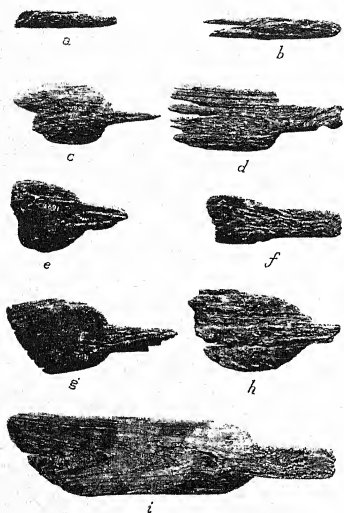


PLATE 74

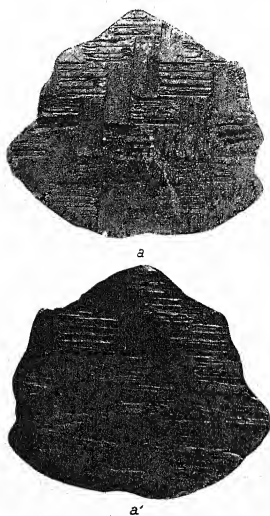


PLATE 75



PLATE 76



PLATE 77

PLATE 74. LOS MUERTOS. WOODEN TOOLS. Length of *i*, 12¼ inches.

PLATE 75. LOS MUERTOS. NEGATIVE (*a*) AND CAST (*a'*) OF MATTING IMPRESSION ON UNDERSIDE OF BAKING GRIDDLE. Greatest width, 8 inches.

PLATE 76. LAS ACEQUIAS. CASA GRANDE RED-ON-BUFF. Diameter of *a*, 8½ inches.

PLATE 77. LAS ACEQUIAS. GILA AND TONTO POLYCHROME VESSELS. Diameter of *e*, 8¾ inches.

PLATE 78. LAS ACEQUIAS. GILA AND SALT RED. Diameter of *c*, $7\frac{1}{2}$ inches.

PLATE 79. LAS ACEQUIAS. CHIPPED IMPLEMENTS. Length of *d*, $7\frac{1}{4}$ inches.

PLATE 80. LOS GUANACOS. LARGE SALT RED JAR. Diameter, 22 inches.

PLATE 81. LOS GUANACOS. PROJECTILE POINTS (*a-d*), GREEN CRAYONS (*e-g*), AND CRUSHER (*b*). Length of *d*, $1\frac{1}{2}$ inches; length of *e*, $1\frac{1}{2}$ inches; diameter of *b*, $5\frac{1}{2}$ inches.

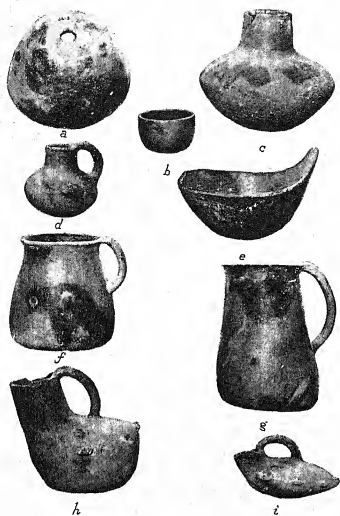


PLATE 78

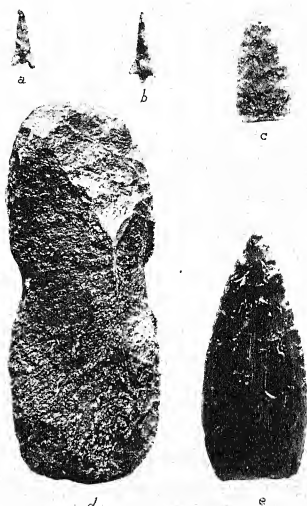


PLATE 79



PLATE 80

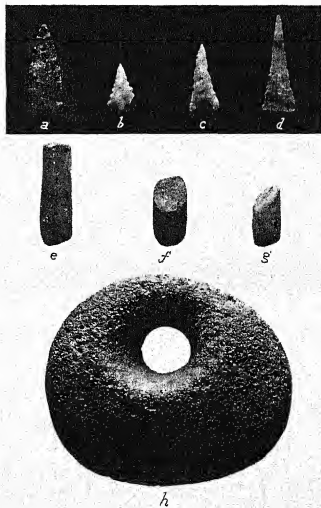


PLATE 81



a



b



c



d



e

PLATE 82. LOS GUANACOS. CLAY ANIMAL EFFIGIES. Average
length, 5 inches.

PLATE 83. LOS HORNOS. SANTA CRUZ RED-ON-BUFF VESSELS.
Diameter of *b*, 10 inches.

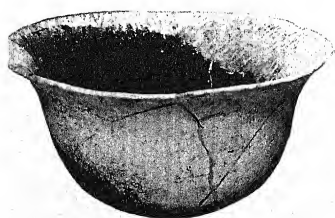
PLATE 84. LOS HORNOS. EARLY RED-ON-BUFF SHERDS. Sacaton Red-on-buff (*a*, *b*, *e*, *f*, *h-n*). Santa Cruz Red-on-buff (*c*, *d*, *g*). Gila Butte Red-on-buff (*u*). Snaketown Red-on-buff (*o-t*). Length of *a*, 3½ inches.

PLATE 85. LOS HORNOS. PERFORATED PLATE (*a*) AND COPPER BELL (*b*, *b'*). Diameter of *a*, 6 inches; *b*, ⅞ inch.

PLATE 86. LOS HORNOS. MISCELLANEOUS STONE OBJECTS.
Length of *k*, 7¼ inches.



a



b

PLATE 83

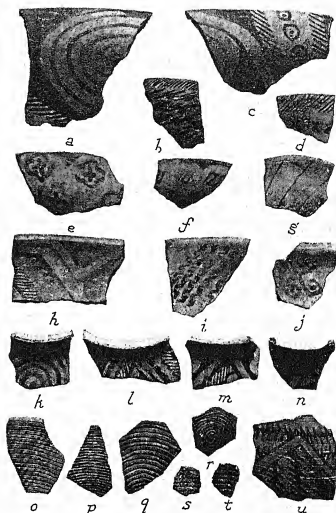


PLATE 84



a



b



b'

PLATE 85

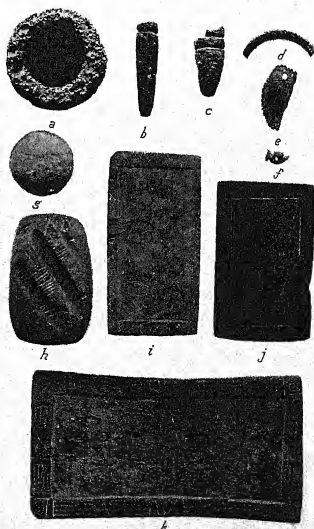


PLATE 86

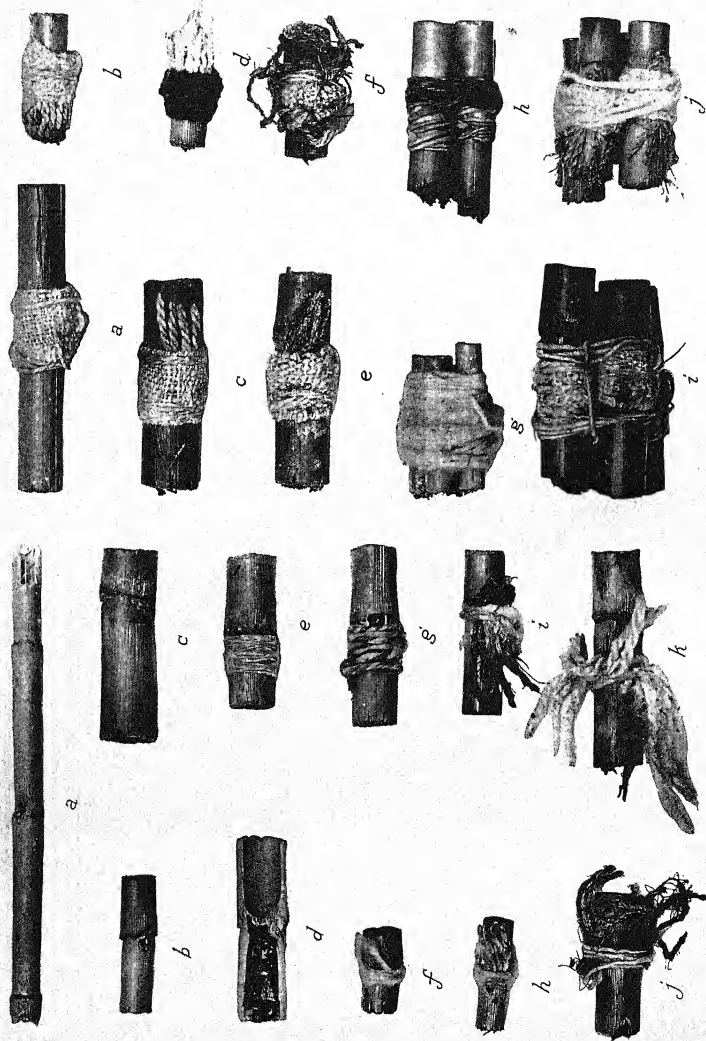


PLATE 88

PLATE 87